

Butter So Good...
You can leave it out for ages!

***21st century techniques recreating historic
methods of high quality buttermaking.***

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DEDICATION

To Jay, who milks the cows every day and
gives me time to pursue my interests.

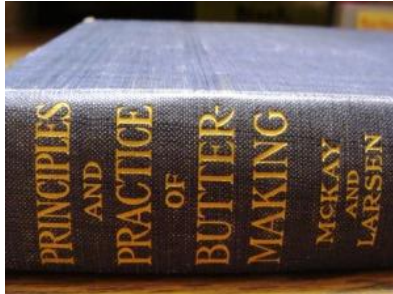


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ACKNOWLEDGMENTS

To the writers of Principles and Practices of Butter-Making, circa 1911.
The book that took all the guesswork out of making butter.



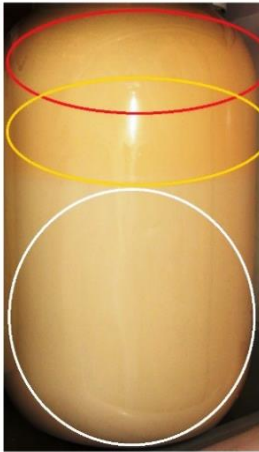
1 PHOTOGRAPHIC VIEW

of the whole process

Want to make butter that's fresher than store-bought?

In a few simple steps, you can create gourmet butter using equipment found in your kitchen!

- 1) Skim the heavy whipping cream off of two- or three-day old milk or start with heavy whipping cream from the store.



HEAVY (Whipping) Cream - 40% Fat

LIGHT Cream or Half & Half - 20% Fat

SKIM Milk - less than 2% Fat

Fresh Raw Milk Equivalents

Butter So Good

- 2) Pour cream into your churn of choice. Fill 1/3 full.



- 3) Turn on churn or start cranking. Watch the transition from whip cream...





...Transition to butter. Depending on several factors discussed in the next chapters, well prepared cream should churn in under 10 minutes.



- 4) Strain out buttermilk. Rinse butter while still in the granular stage.



- 5) Work the butter – working the lumps into a smooth mass and removing remaining rinse water.



6) Add salt, flavorings, etc.



7) Use or store butter!



It's that easy!



2 MILK & CREAM QUALITY

Milkfat	The lipid (fat) component naturally found in cow's milk.
Butter	A water-in-oil emulsion of primarily butterfat with some milk solids-non-fat and water.
Butterfat	The fat components in milk that can be separated during the churning process. Pretty much the same as milkfat.
Butter oil	The fat of butter, clarified for the removal of milk solids and water through a commercial centrifuge process that does not involve heat. Very shelf-stable.
Clarified butter	Butter warmed at a low temperature to evaporate water, then strained to remove most of the milk solids. Has a mild taste. Longer shelf life than butter.
Fat globules	The individual, round pieces that make up fat.
Ghee	Butter warmed and simmered to create a nutty flavor. Water evaporated and decanted to remove milk solids. Extremely shelf-stable. Not creamy/milky tasting.
Whipped Butter	Commercially, butter is whipped with the addition of air or nitrogen. Home-style, softened butter with a little water or milk added, whisked together. Short lifespan.

Butterfat makes up around 3-6% of the total content of milk.

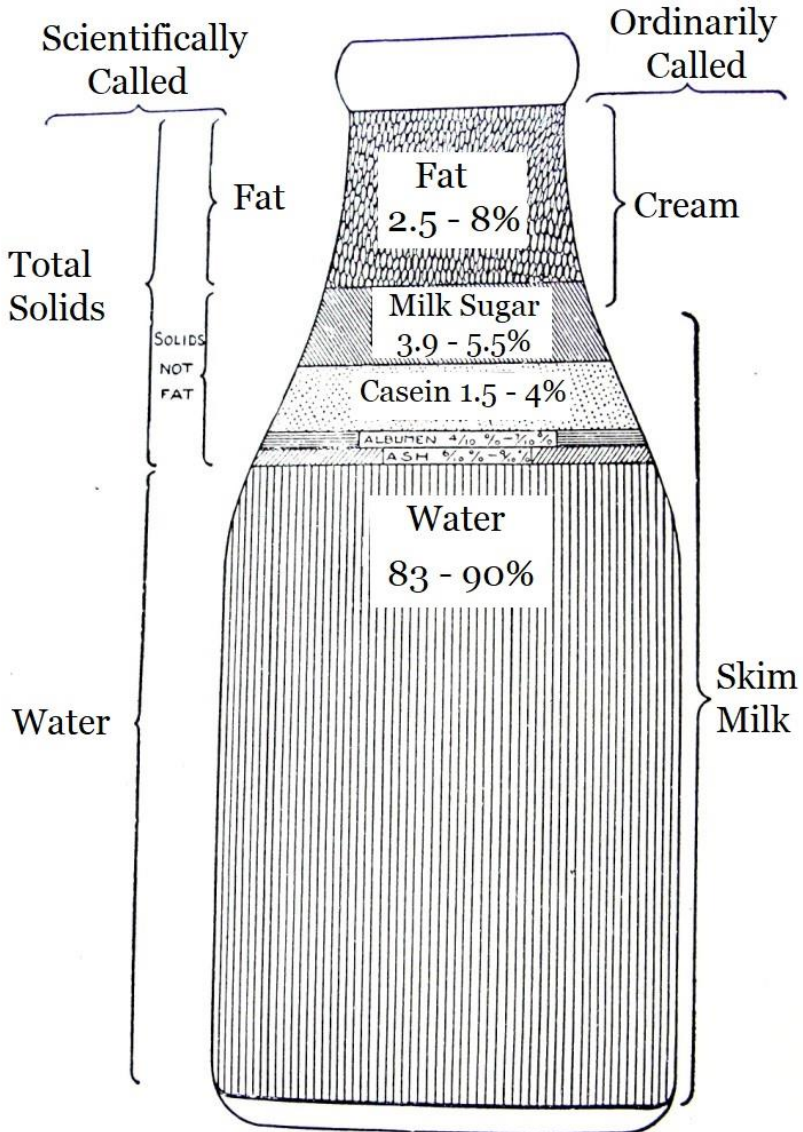


Chart adapted from The Principles of Dairying, Henry Judkins, 1925.

Butterfat quantity and quality can be altered by breed genetics, animal health, and certain types of feed.

- (1) Spring pasture diet makes soft fats, which churn easier. Winter feed, dry food, creates hard fats. Calving cows in spring can maximize the benefit of spring and summer pasture benefits. In winter, the addition of moisture (succulence) and proper fats in feed can improve churnability.

“It has been highlighted that the concentration of unsaturated FAs and CLA in milk fat [from pasture-fed cattle] correlates negatively with that of SFA, and this relationship affects the texture (softness/hardness) of dairy products such as butter”

– from [The Grass-Fed Milk Story](#)

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6723057/#B94-foods-08-00350>

- (2) Different breeds and cows within breeds can naturally produce softer or harder fats. We have Jersey cows which produce the softest fats, generally. (*Jerseys have the “largest fat globules” which readily churn and make the breed known for “easy” buttermaking.*) Yet, even within breeds there can be differences. We have a modern Canadian Jersey (who produces the large, soft fat) and also an old-fashioned American Jersey (who produces small, hard fat).

One way to tell with your own cow is not only in how fast her butter churns, but in **how quickly the cream rises to the top of a jar of milk**. For example, goats have tiny fat particles, therefore their milk is commonly referred to as naturally homogenized. Dutch Belt and Holstein would be the cow equivalent to the fat size in goats’ milk. Whereas the cream in Jersey milk rises rapidly.

Generalizing butterfat by breed is difficult due to so many factors that can change butterfat percentage within an individual cow. In general, below is a chart of highest to lowest butterfat producers by breed:

CATTLE

Jersey	4.6 - 6.0
Guernsey	4.4 - 4.8
Angus	4.99
Devon	4.90
Ayrshire	3.8 - 4.2
Brown Swiss	4.0 - 4.2
Fleckvieh	4.20
Dexter, Kerry	4.18
Milking Shorthorn	3.5 - 3.9
Holstein	3.6 - 3.9

GOAT & SHEEP

Nigerian Dwarf	6.2
Nubian	4.9
La Mancha	4.0
Oberhasli	3.9
Alpine	3.4
Saanen	3.3
Toggenburg	3.2

<https://extension.psu.edu/dairy-goat-production>

- (3) Lactation status affects fat size. The size of butterfat is the highest when a cow is fresh and early in her lactation. Toward the end of lactation, fat globules get smaller and smaller, which is why some people milking only one cow that is late in lactation may often find buttermaking very difficult, even with the abundance of cream that late lactation usually provides...
- (4) Age and body condition can affect the quantity of cream produced. Heifers (first-calving cows) tend to have lower butterfat percentage in their milk than mature cows, as some of their energy is going into growing as well as producing milk, therefore there is rarely extra fat to go into the milk. Similarly, as cows age and when cows are fed well

or come from low production bloodlines, they tend to put on weight. A healthy amount of fat on the body of a cow helps maintain a healthy amount of fat in the milk. Excessively fat cows tend to have higher risk of metabolic problems, but one perk – they also tend to have higher fat milk!

- (5) Letdown, the action of a cow’s brain triggers the hormone oxytocin to release, causing a cow’s milk to “drop” by stimulation of calf or milking machine. The first milk to come out is lowest in fat – can be 1% or lower. The hind milk is extremely fatty – 8 to 12% or more. When blended, the cream balances out to the standard 3-5%, give or take.
- a. In sharemilking situations, cows quite often hold up their milk. Cream is the last milk to come out of the quarter, so a cow holding up will give skim milk. See our website (<https://spiritedrose.wordpress.com/2018/02/22/holding-up-milk/>) for information on how to fix letdown issues with your cow.
 - b. Time of day milked: Cows tend to have a fuller letdown when milked at 12 hours or more since the prior milking. If milking on a schedule different than 12 and 12, such as 11 hours on evening milking and 13 hours on morning milking, the morning milking would tend to provide more cream.
 - c. If hand milking, note that letdown occurs for up to 15 minutes. The faster you can milk the cow out, the higher the likelihood of obtaining all the cream she has to offer.

Examples of Color Differences by Breed:



GOAT – HOLSTEIN – JERSEY – GUERNSEY

Examples of Color Differences by Season:

Same cow, butter color by season:



SUMMER – WINTER – COLOSTRUM

Purchasing Cream?
 Purchase only Heavy Whipping Cream (approximately 40% fat).
 Commercial creams are all homogenized, so you cannot skim off the top half in order to get a thicker cream.
 Most commercial milk is produced by Holstein cows, often in confinement feeding, so the resulting butter is likely to be white or off-white.



FDA Cream Standards:

Type:	% Milk Fat:
Half-and-Half	10.5 – 18
Cream	18 – 30
Light Whipping Cream	30 – 36
Heavy Cream	36+

Information compiled from: <https://naldc.nal.usda.gov/download/CAT87214663/PDF>

3 PREPARING CREAM



How much cream
to make a pound
of butter?

One quart
of heavy cream
– approximately –
makes
one pound
of butter and 1 – 2
cups of buttermilk.

Manually collecting cream:

When milking one cow, the use of a cream separator is often more work than it's worth. In that case, we use a ladle, measuring cup, or skimming spoon to scoop cream off the top of fresh milk after the cream has risen for a day or two. The longer the cream sets, the thicker the top cream will be. Butter is best made from either cream separator cream or only the top half of cream skimmed from a jar – whipping cream thickness.

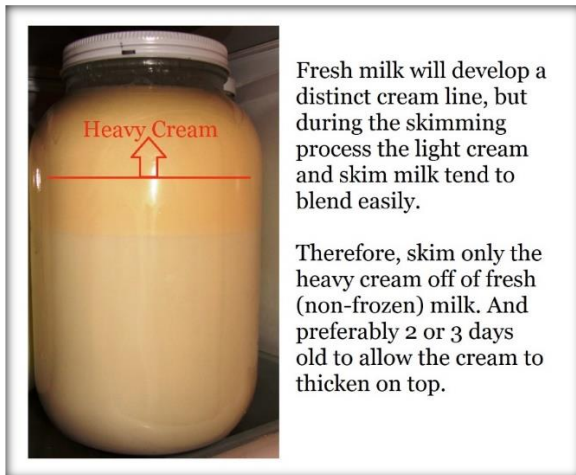


HAND SKIMMING:

Fill a gallon jar or stock pot with fresh milk. An ideal container is tall and narrow with straight sides (for ease of skimming out the cream).

Let set at least 24 hours and up to a few days.

Skim off the top with a soup ladle. Stop skimming as soon as you see skim milk.



FREEZING TIP:

Freeze the cream for extra separation of fat and liquid, a method called “crystallizing” the cream. Hand skimming inevitably includes more light cream than is generally suitable for churning, unless you skim only the top third after several days of sitting in the fridge to rise.

By freezing, I can skim day-old or two-day-old milk that is still very fresh. I can also take all the cream – skimming down to the line where the cream has risen and separated from the skim milk.

I then freeze in wide mouth containers such as a potato salad container or freezer-safe jar. When I have enough cream frozen to make a couple batches of butter or more, I remove the containers from the freezer and set them on the counter to mostly thaw. Set in the fridge to finish thawing.

In summer, I skim directly into the mixer and mix at 40°F. In winter, if the cream is hard to churn, I gently warm up the cream to 60°F on the stove before pouring into the mixer.



**Frozen milk
clears up the line
of separation
between cream
and skim milk.**

**For frozen milk,
skim cream all the
way to the skim
milk (watery)
level.**

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Frozen lump in middle (wait to skim) – Cream level (ready to skim)



Cream floating (skim more) – Cream removed (skimmed enough)



The below photo illustrates how distinctly the freezing process separates fat from water!



Important note: The information about skimming cream is specific to cattle, whose milk fat globules are larger in size and lighter in weight than water. They therefore “float” to the top of milk in the form of cream.

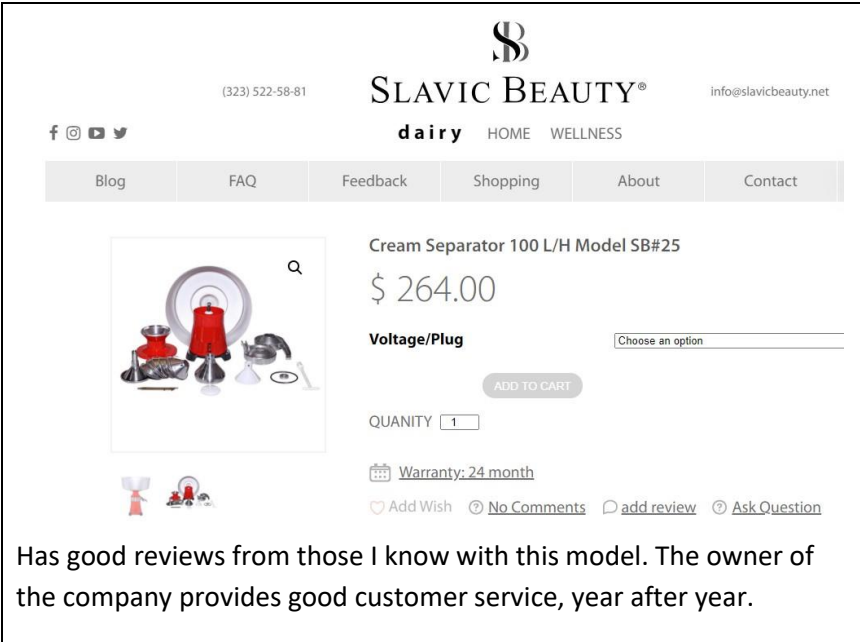
Sheep and goat milk have smaller fat globules that do not float to the top nearly as well as cow’s milk does. Skimming would require likely a high-butterfat animal with several days of letting the cream set. Therefore, most sheep and goat milk producers use a separator if desiring cream.

CREAM SEPARATOR:

The cream from a cream separator comes out thick and ready to churn. That is a nice perk of a cream separator, if you have one and can justify the time spent warming the milk, separating, and cleaning equipment. We found that having 3-4 cows or more in milk justified using the separator.

With a small kitchen table size model, some home creameries may find a separator worth the effort, even for one cow. In that case, below is a chart on the types of separators available today:

WHICH SEPARATOR TO BUY?



The screenshot shows the Slavic Beauty website interface. At the top, there is a logo with a stylized 'S' and 'B' and the text 'SLAVIC BEAUTY®'. Below the logo, the word 'dairy' is written in a lowercase, bold font, followed by 'HOME' and 'WELLNESS'. To the left of the logo, there is a phone number '(323) 522-58-81' and social media icons for Facebook, Instagram, YouTube, and Twitter. To the right, there is an email address 'info@slavicbeauty.net'. Below the logo and navigation, there is a horizontal menu with buttons for 'Blog', 'FAQ', 'Feedback', 'Shopping', 'About', and 'Contact'. The main content area features a product listing for a 'Cream Separator 100 L/H Model SB#25'. The product image shows a red and silver cream separator with various accessories. The price is listed as '\$ 264.00'. Below the price, there is a 'Voltage/Plug' dropdown menu with the text 'Choose an option'. There is an 'ADD TO CART' button. Below the button, there is a 'QUANTITY' input field with the number '1'. There is also a 'Warranty: 24 month' label. At the bottom of the product listing, there are links for 'Add Wish', 'No Comments', 'add review', and 'Ask Question'. Below the product listing, there is a text block that reads: 'Has good reviews from those I know with this model. The owner of the company provides good customer service, year after year.'



Milky offers a high-end unit at the homestead or small creamery level.

They reduced the price of the machine by switching from stainless steel cones back to a cheaper metal.

This model has good reviews, but is beyond the pocketbook of most small homesteads.

Nasco

SHOP

PREPARE

DISCOVER

K-CAREER™
SOLUTIONS

SAVE

NEED HELP?



MODEL #19 CREAM SEPARATOR

\$200.00



MODEL #15 CREAM SEPARATOR

\$292.00



MODEL #18 CREAM SEPARATOR

\$325.00

Motor Sich type separators are inexpensive and have mixed reviews. They seem to lack the ability to adjust the cream thickness, so the cream comes out extra-thick (so thick, the cream turns butter-like and hard in the fridge unless some milk is blended back in).



Minnear is a small, easy to clean separator currently available.

Recommended by a friend that runs a small dairy.



Old cream separators do exist.

The initial downside to an older model is the lack of ability to find parts if parts go missing and the concern over possible lead joints. (The initial cream coming out of the spouts cools and sticks to the spouts. The rest of the cream pours out of the spout without ever touching the metal. Therefore, in my opinion, any risk is negligible. Feel free to test if you are wary!)

The upside: Older models provide the best cream skimming with a high level of adjustments so you can skim just the right thickness and quality of cream you want.

If going this route, research what parts a separator should have. Check the quality of the cones closely.

Manual from a DeLaval Junior Separator:

<https://spiritedrose.wordpress.com/cheese/cream-products/delaval-cream-separator-manual-1940/>

Tips to properly separating cream using a cream separator:

- Maintain a warm temperature fresh out of the cow or reheat to 90-100 degrees F.
- Close pour spout before pouring milk into retaining bowl on top.
- Hand crank or turn on electricity and wait for separator to speed up to proper speed. (Mine has a bell that stops ringing when you're going fast enough.)
- Pour a small jar of warm or hot water onto the float (bypassing the top tank and valve) and let the water warm up the metal parts.
- Slowly open pour spout and allow to separate a thin flow. If everything comes out the proper spouts, the flow can be increased.
- Do not stop between cows or pots of milk. The earlier separated cream remaining on the disks will cool and thicken, clogging all the ports.
 - Maintain speed of rotation of the separator, even if there is no milk being separated.
 - When the next batch of milk is ready, pour it in and repeat process and you should be able to avoid any clog issues.
- When finished, run warm water through again to rinse the parts. They still need to be taken apart and thoroughly cleaned and dried.

PREPARING CHURNING CREAM FOR CHURNING:

According to the Principles and Practices of Buttermaking:

“The degree of hardness of the fat in the cream is the governing factor in deciding the churning temperature [and overall churnability of cream].”

The hardness of the fat depends upon the breed and season factors discussed in the prior chapter. Harder fat needs to be churned at a higher temperature. Softer fat needs to be churned at lower temperatures.

What is the magical temperature?

The average desirable churning temperature under normal conditions is:

- between 40°F and 50°F in summer months
- between 50°F and 60°F in winter months

In summer, I can pull the cream straight out of the fridge (at 40°F) to churn. In winter, I warm the cream to 55-60°F before churning. A notable exception to the rule might be if the cow calves in the fall or winter months, as her early lactation fat globules may be larger and easier to churn.

CASE STUDY: November 4, 2020:

To test the theories about factors affecting the churnability of butter, we experimented with milk and cream.

Test #1 is primarily using our regular method of churning with only one change: increased initial temperature of the cream when churning.

I followed my regular routine of preparing the cream:

- *Skimming cream off of milk that is 2-3 days old,*
- *Freezing the cream completely,*
- *Thawing the cream at room temperature until mostly thawed,*
- *Skimming the cream, a second time for a thicker cream.*

I stirred the cream up evenly and split into two batches:

- 1) *Batch #1 – Churned at 40°F*
- 2) *Batch #2 – **Warmed the cream in a pan on the stove to 60°F***

THE RESULT:

- 1) *Batch #1 – Took **22** minutes to churn*
- 2) *Batch #2 – Took **9.5** minutes to churn!*

Warming cream to 60°F saved 12.5 minutes of churn time!



Does raising the temperature harm the quality of butter?

High temperature can create issues with butter by over-incorporating buttermilk back into the butter, which reduces the quality of butter and increases the risk of rapid rancidity.

Churn butter at the lowest temperature possible to complete churning (fully removing butter from buttermilk) without reincorporating buttermilk (excess moisture).

Sometimes, no matter out best efforts, butter churns into a high moisture blob! That is ok – you still have butter that can be:

1. Frozen for future use in cooking
2. Clarified or simmered into ghee
3. Eaten fresh (that day)

In sampling butter churned at 40°F versus butter churned at 60°F, both came out with the same consistency.

Both churned into a sweet, smooth butter.



4 CHURNING CREAM

Types of Churns:

MODERN MACHINES from your KITCHEN



KitchenAid style Mixing Stand:

This is currently my preferred method. Mixing stands are relatively inexpensive compared to commercial buttermaking machines. I purchased a commercial quality one from Costco for under \$250 on sale.

They can be adjusted to many settings, for precise churning.

** HAND MIXERS can work as well; they just get tiring to hold.

Food Processor:

This method is fast and effective, but I ended up burning out the motor on the unit. The modern units are *much smaller*, so your ability to churn in bulk is quite limited. It's a case of 'if you have one, great' but if you don't, I'd buy a mixer instead for making butter. Some say the blade "cuts" and damages the butterfat, but I did not find that to be the case, as the butter quality and time fresh remains excellent.



Blender:

An economical beginner option, as most people have a blender of some form. Blenders quickly turn cream to butter, but because of the design of the blade, a blender turns butter into a lump that is impossible to clean properly. With diligence, one may be able to stop the blender before turning the granules into a lump, but I did not have luck attempting that.

Canning jar with lid:

A great school project to teach kids the idea of how to make butter.

This method works in about 20 minutes and is a fun project or for making a little butter off milk you have bought.

Not as practical for a dairy farmer with lots of cream!



There are also many butter churns available for purchase (or to make from supplies you have on hand).

CHURNS AVAILABLE for PURCHASE



Electric:

Many people use and enjoy electric churns. Some are even designed to hold a large quantity of cream and because the jar is enclosed with a sealed lid, there's no risk of splatter. The downside for some is the cost – they are easily as expensive as a KitchenAid mixer, but more difficult to source and find parts for and they only have the one use (whereas, a mixer has many uses).



Bucket with lid and stainless/wood paddle on standard woodworking drill:

A square bucket (to assist agitation) and a lid (to prevent splashing and help stabilize paddle) with a hole in the lid to fit a wood paddle (a long kitchen spoon worked for us) or stainless-steel paddle (available at a few specialty stores – try Cottage Craftworks). A clear lid or plexiglass type lid would be preferable so you can see what you are doing. Many are homemade. We could make about a gallon of cream churn at a time for bulk buttermaking in an inexpensive setup! The process is a little tiring if you have to manually hold up the drill.





Top-Hand Crank:

Very slow and ineffective, in my opinion. They look fun and nostalgic, but I would sometimes churn for an hour and not get butter! Not fun!



Dash/Barrel Churn:

This style of churn is slow but can be effective in making a large batch of butter.

The options pictured here are available (new!) from Lehman's store.

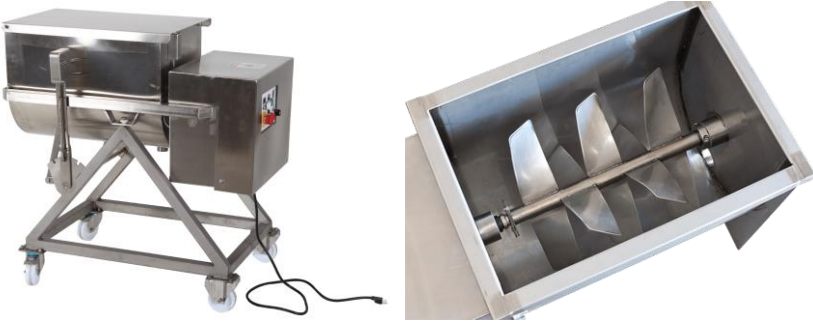


Side-Hand Crank:

This style is generally unavailable for sale, though we can see old examples in museums and antique stores. I would love to have a new model of this type of churn – which is quite similar to the commercial mini-churns that I have seen in small creameries! If you see someone selling a new model, will you let me know!?



And for those serious about butter, there are some cottage/artisan size buttermaking machines available through dairy supply stores such as Bob White or Hamby.



Commercial Stainless-Steel Churn:

Does the whole process: from cream to rinsing to working butter.

I have personally tried a couple other options that haven't worked:



Electric Ice Cream Mixer:

I tried this once, thinking back how every time I made ice cream, the ice cream seemed to turn to half butter. No-go. I churned for upwards of 40 minutes with absolutely no change in the cream.

Conclusion: The warmer cream for churning butter reduces friction on the unit, so very little agitation occurs.

Immersion Blender:

A friend attempted this. Her results were that the blender took too long and the motor started to overheat. In summer, with soft fat, and perfectly skimmed cream, this method may be possible.



Noise:

Some machines are noisier to use than others.

Noise Level:	Various machines:
No Noise:	Crank, Dash, Jar Hand Churns
Some Noise:	Bucket Drill, Electric Churn
High Noise:	Mixer, Food Processor, Blender

*** I wear exterior muffling headphones when using machine churns. Noise is a big reason why I look for the methods to make butter churn the fastest!**

Splash:

Most models are covered or sealed before starting the churn.

A couple of the common kitchen units are more open and will splash around the kitchen unless covered.



Model:	Preventing Splash:
KitchenAid or Hand Mixer	Install plastic guard. Drape towel over the top of machine. Start on slow and increase speed as cream thickens.
Food Processor	Place cup over open top spout

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The churning process:

Pre-treat cream by warming on stove to 55-60°F if containing a harder fat. Use cream straight from 40°F fridge if summer/soft fats.



Fill churn 1/3 full of cream (which is about 1 quart of heavy cream for a KitchenAid mixer).



- 1) Fill 1/3 with cream
- 2) Whips to double size

Apply splash guard and towel (or lid, etc.) to prevent splashing during churning.



Turn ON a low setting and start to whip the cream. If you turn on high while the cream is liquid, you will get splatter all over the kitchen.

At first, the cream will slightly thicken with bubbles:



Next, the cream will turn into whipped cream like you would put on top of a dessert.

Once the cream has started to thicken like this, the churn can be turned on high without much risk of splatter.



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The whip cream will “turn” past cream to look like over-churned whipped cream with lumps:



In another minute or two, getting hints of buttery chunks. Start to watch very closely at this stage. You almost have butter.



At this point, I like to stop and wipe down the sides of the bowl to reincorporate any cream that has splattered to the sides (otherwise, when pouring off the buttermilk and butter, you'll end up with cream chunks that will spoil the end product).



Turn the churn back on to a medium speed.

The cream will start to separate, first showing a little buttermilk seeping out. The mix is still mushy and not well defined, keep churning.



Turn the churn speed to a low setting. Watch carefully as more and more buttermilk separates out.



When to know to stop churning:

- Size of granule similar to the size of a kernel of wheat or a flake the size of a kernel of corn
- The granules start to stick together like small pieces of popcorn
- Bluish tint to buttermilk
- Butter raises higher above buttermilk

Why care about when to stop churning?

- If churning ceases too soon, some fat is lost to the buttermilk and rinse water.
- If over-churned, the butter will reincorporate buttermilk into the butter, making the butter pale (because it contains too much buttermilk/water). This can produce off flavors quickly, therefore is only suitable for cooking.

Churn a little past the tiny granular stage.



Look for little lumps of butter to cling together. Stop when the butter is in-between these two photos. This process may happen very gradually over a few minutes (as seen in top photo, with hard winter butter) or may happen swiftly, in just seconds (as seen in bottom photo, with soft summer butter).



Strain off buttermilk first if planning to keep that. A mesh strainer works well at straining the buttermilk and catching clumps of butter that flow along.



How much buttermilk you end up with depends on the cream you started out with. In the above photos, I had skimmed frozen and thawed cream and did not add all the skim milk below the cream line. So, there was very little buttermilk. You need a certain amount of buttermilk in order for the churning process to work, but not so much buttermilk that the cream is watery and unable to split into butter and buttermilk.

What is buttermilk?

Cream becomes butter and buttermilk – the separation of fat and water.

Natural buttermilk is made up of the remainder of milk after the fat has been removed in the buttermaking process. Primarily water, protein, and other solids-non-fat, buttermilk has a similar consistency as skim milk. Great for healthy drinks or for adding to recipes – note it will be thinner than “cultured” buttermilk in the store. Adjust accordingly.



Cultured buttermilk, what people are more familiar with today, is not really buttermilk. Rather, it’s a concoction of skim milk, bacterial cultures, preservatives, and salt.

Cleaning the churn:

- First, rinse with lukewarm water.
- Wash thoroughly with soapy water.
- Rinse with lukewarm water.
- If still greasy, repeat soap wash and rinse.
- Once clean, do a final rinse with scalding hot water.
- Air dry completely.

If sour smells develop (an issue with wooden parts), sanitize the equipment by wiping or spraying on vinegar. Let set a few hours, then rinse off with hot water and dry completely.

For wooden churns, McKay and Larsen recommend food grade lime in a liquid solution to be put in the churn. Swish around and let set until next use. Before using again, rinse out lime.

5 RINSING

Why rinse butter?

The single most important part of making butter is the rinse process. Rinsing removes buttermilk, the excess moisture that is the primary cause of premature souring.

Rinse with cold water. Use only clean water sources. The water should be the same temperature as the butter or colder (if the butter has gotten a little too soft during the churning process) to avoid melting the butter. Extreme changes in temperature should be avoided. If the butter has warmed up too much during churning, gradually reduce the butter temperature through the wash water. For example, if the butter is 65°F, rinse with 60°F water, then 55, 50, 45...

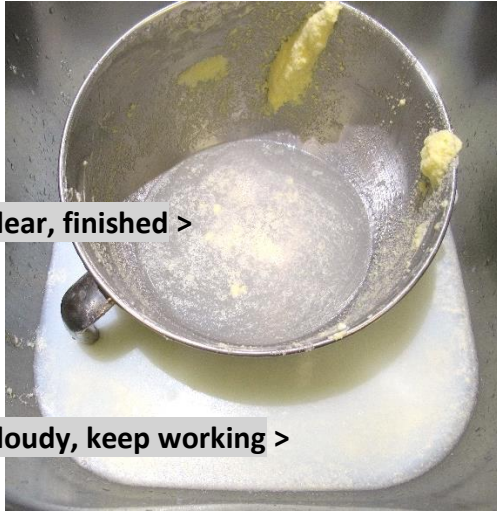
- In summer, we churn at fridge temp, so around 40°F. Rinse water should therefore be 35-40°F.
- In winter, we churn at a warmer temp, so around 60°F. Rinse water should therefore be 40-55°F.



Add ice cubes to tap water if your water source is warmer than you want for rinsing.

Butter should be rinsed 2 to 4 times or until rinse water comes out of the bottom crystal clear.

Rinse water – clear, finished >



Rinse water – cloudy, keep working >

Either add cool water to the churn and slowly agitate the butter around the water OR pour some of the granules of butter into the mesh strainer and rinse over a sink. Be sure to test the faucet water temperature with your hand or a thermometer before placing the butter underneath.



If butter is rinsed properly, with cool water and in the granular stage of butter, 100% of buttermilk can be rinsed out of butter.

This is the single most important step in creating butter that can stay fresh when sitting out on the counter for days!

6 WORKING

Why work butter?

Working transitions butter texture from granulated bits to one solid mass with no holes or cavities.

Working also removes the rinse water.



If rinsed properly, buttermilk will not be evident. Rather, only clear water will be expelled. Almost all excess water is worked out.



Working the butter:

- Only start working butter when a firm/solid consistency – cool by adding cold water if needed to firm up butter before working.
- Butter should be worked (like kneading, but with a paddle) 10-15 times to fully incorporate salt and expel excess water.
- Soft butter works faster – stop as soon as smooth and even consistency.
- Hard butter may need to be worked longer to obtain a smooth texture. Work as long as necessary to break down all the individual grains into one smooth mass.
- If you have to put the unworked butter in the fridge (say, you run out of time before working and packaging the butter), either leave the butter out for 15-30 minutes at room temperature or microwave for about 10 seconds to re-soften the butter to make working the butter much easier.

TOOLS FOR WORKING BUTTER



Butter Paddle:

I tried working butter with my hands (which works great, but is messy...).

Then, tried using household spoons (too narrow and liable to break under the pressure).

I found an authentic butter paddle at a museum gift shop. Finally! It clicked why butter paddles were invented – they work amazingly well! The wide, curved paddle contours with a bowl to squeeze excess moisture out of the butter!

Your own hands:

Even though I use the butter paddle to work the butter, I also always use my hands in the final shaping of butter. The whole process of working can be done by hand, though my primary objection to working butter by hand is because the warmth of your hands quickly warms up and melts the butter! So, I save hand-work for the very end – to fill molds or form freehand shapes.



Commercial units:

I keep in the back of my mind the possibility of making or buying an official butter worker for summer months when I could open a creamery for the amount of butter our little farm produces! Ahh, the dreams of a yeoman farmer!

The photo is from Billings Farm & Museum in Woodstock, Vermont. An excellent museum full of information (and a real, live herd of beautiful Jersey cows!)

For a modern use of a butter working machine, see the French butter making video referenced on the next page.



Leftover water?

A common complaint when working butter is that “one can never get all the water worked out” – this is true in two ways:

Butter naturally contains water – more than 10% and less than 20%.

When using human strength, often the human wears out before the water is all worked out of the butter.

Keep in mind that pure water (especially when salt is later added) will not affect the lifespan of butter nearly as much as buttermilk will. I often have little droplets of water left when done working. We freeze our butter for storage and a lot of the excess water evaporates out during the freezing process, so once thawed for use, most of that excess water clings to the packaging.

If you want to remove all the liquid for something like a pastry project, a method is to put (quite cold, firm) butter between two sheets of waxed paper. Roll to about ¼” thickness using a rolling pin. Peel off the paper. Shake paper dry. Fold up the butter and roll out again, if necessary, to remove more water. I tend to not do this step anymore, as I want to conserve my resources and not use up excess waxed paper. But, in a pinch, this method does work.

7 NATURAL ADDITIVES

Once the butter is initially worked, then any additions can be added to flavor the butter.

Jean-Yves of Le Beurre Bordier in Brittany, France says:

“During the kneading process, the butter is salted to taste with fine salt. The fat molecules in the butter react and release the butter water. It is said that the butter begins “to cry.” It develops aromatic qualities, a depth and a complexity of incredible aromas as well as an elegant texture.”

A fascinating video about Bordier, created by Food Insider, can be viewed at:

<https://www.insider.com/how-traditional-french-butter-made-beurre-bordier-brittany-malaxage-2020-3>

Salt:

Salt is the most common flavor additive.

What is the difference between salted and unsalted butter?

The only difference between salted and unsalted butter is literally that salt has been added to one and not the other.

Why is most butter salted?

- To impart a pleasant, desirable flavor
- To increase the keeping quality of butter

How much salt to add?

- American butter averages 1.6% added salt content. Clean, fresh butter requires little salt (you don't want to mask the butter flavor!) Test your preference by measuring a small amount of salt and butter.
 - **Suggested amount: ¾ tsp. salt per 1 cup of butter.**
- **When to add more salt:**
 - Use a higher amount of salt if the butter is high-moisture.
 - If the butter is worked a lot, more salt should be added as some will be lost in "brine" form as moisture drips out of the worked butter.
 - Hard granular butter may need more salt, as it does not easily incorporate.
 - Older or poor-quality butter may require more salt to help preservation.
- **When to add less salt:** Soft greasy butter readily attracts salt, so less should be added.
- **If you prefer unsalted butter:** please keep the butter frozen until use. Unsalted butter does not keep nearly as long as salted butter and also may have a flat flavor.

Other Natural Additives:

Natural color, herbs, seasonings, and flavored salts can make butter unique.

Coloring:

Some cows (especially in winter) plus goats and sheep produce light colored or white butter. Natural colors can add a tasteful touch of yellow color to create a more-recognizable looking butter. A local friend of mine colors her goat's butter for guests and proudly notes that:

"No one ever realizes the butter comes from goats, it's so good!"

Try adding the color to the cream before churning or to the butter before working – see which method works better for you.

Note that some flavors, especially if added at higher concentrations, are bound to change the flavor of the butter a bit. If unsure, test 1 tablespoon of butter with a drop of coloring and taste test first. Less is usually better.

Examples of natural colorings include:

- Carrot juice
- Marigold
- Saffron
- Turmeric
- Annatto



Flavoring:

Adding Ingredients:

Work butter out to a wide, flat shape. Sprinkle flavorings or color evenly across the top of the butter. Fold the butter closed. Knead until fully incorporated.



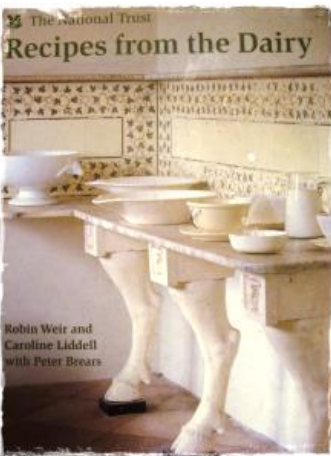
If ingredients are added that are wet, such as garlic or honey, there may be some sticky “seepage out of the butter, as the water and oils do not always blend well. Try warming the butter a bit to room temperature before adding wet ingredients.

- *Garlic Rosemary Butter (aka Sicilian Family Blend)*: Our family blend includes garlic (preferably fresh) and dried, ground rosemary. Per cup of butter, add approximately 1 garlic clove (or 1 tsp. powder) and ½ tsp. rosemary powder. Adjust to taste, noting the garlic will slowly infuse the butter over a couple days if allowed to set.
 - Warning: This is a potent garlic product and will contaminate your fresh milk products if you store it in the fridge – we suggest storing in tightly sealed containers.
- *Honey Butter*: Start with room temperature or spreadable-consistency butter. Whip with a mixer until the butter is fluffy. Add 20-50% honey to butter. If trying for the first time, try with minimal honey: ¼ cup honey to 1 cup butter. Add more, to taste. If using unsalted butter, add a pinch of salt. Honey butter can be further flavored with complementary spices such as:
 - Cardamom
 - Cinnamon
 - Vanilla
- *Hot Pepper Blend*: To one cup of butter, add approximately 1/8 tsp. cayenne powder, ¼ small chopped jalapeno, and ¼ tsp. turmeric



Some seepage is natural with fresh or wet ingredients. Once blended to your taste, shape and package butter.

I tend to NOT use my molds for flavored butters. Spices tend to mar any designs or stamps within molds. Also, spices can stick to the molds during the cooling process, causing off-flavors in future butter that is shaped in the same molds.



A fun book with some wild and “savoury” butters is:

Recipes from the Dairy

By: Robin Weir and Caroline Liddell
with Peter Brears

Published by the National Trust
(Britain)

GHEE RECIPE:

If you know what ghee is, you can see that ghee is clear, kind of see-through like olive oil. Butter, in comparison, is solid colored due to the solids (protein, milk sugar) found in butter. Ghee is the clarification of butter to create pure butterfat oil.

To make ghee:

- Add unsalted butter to a saucepan over low heat until melted. A layer of white cloudy foam will form along the surface of the melted butter. Use a spoon to skim off the foam.
- Simmer for 30-35 minutes or until the milk solids just turn to a nutty brown color (but not burnt!). Scrape down the sides as needed so that all the milk solids separate out and settle to the bottom of the pan. Skim off any additional foam. Turn heat off.
- Allow mixture to settle. Carefully pour liquid through a mesh strainer lined with cheesecloth. Stop when you start to pour out the milk solids in the bottom.
- Finished ghee is completely clear, devoid of all water, milk solids and impurities.
- Store in an airtight glass jar next to your other oils.



Warm Ghee



– Cooled Ghee

8 SHAPING & STORAGE

BUTTER SHAPERS & MOLDS



Hardwood Grooved Paddle:

Once butter is worked, final artsy work can be applied to butter using a grooved paddle.

(Incidentally, you can use this to shape grooved gnocchi as well, if you are an avid Italian eater like me!)

Lehman's and other home goods type stores offer this and many other butter-working equipment.



Hardwood Butter Press:

Bob White (shown here) makes a Maple butter press that forms a one-pound block of butter, just like you would buy in the store.

Check eBay, Etsy, or home good stores for options. Or, ask your neighborhood woodworker, maybe they would love to make you a press!

Butter Molds:

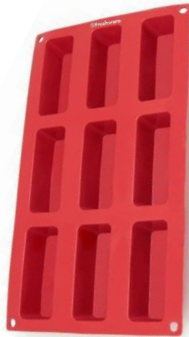


Molds such as these ones sold by Lehman's form a shaped butter. Lehman's advises:

"To use butter mold, soak in cold water for 30 min., then add butter and chill. Comes with plunger to push butter out."

The downside: They are often difficult to remove the butter without marring the shape.

Silicone forms:



Forms come in various shapes.

One is 1/2 cup stick butter shape for standard baking measurements.

Available from kitchen retail stores and big stores such as Amazon or Walmart.

Ice Cube Trays:



Look for items you already own. We use ice cube trays to make single servings to place on butter dish.

Smaller amounts are handy for beginners while you are still learning to make quality butter that stays fresh on the counter for a longer period of time.



STORAGE OPTIONS



Tabletop Dishes:

Butter cows or butter bell jars are decorative and cute. Great for on-the-counter fresh butter options.

Personally, I found the butter bell to be annoying (bottom is filled with messy water) and if you do a good job cleaning your butter, really unnecessary.

***Countertop butter (left out for a day or more):**

Only use salted butter & in kitchens that are 70°F or cooler.



Canning Jars:

8-ounce Kerr canning jar are a perfect one-cup baking size that are well-sealed, handy for freezer storage. I use them for single-serving ice cream

bowls and jam jars, too.

Any type of jar, preferably one with a rubber gasket to seal, works for butter storage.



Wax paper or butter paper:

When making bulk butter, waxed paper makes for a quick wrap for butter of any size.

(below)
Antique butter paper:



Butter So Good

Of course, the best method is to enjoy butter fresh!



How to know if your butter has gone bad:

- Sniff test - does the butter smell rancid?
- Taste test – does the butter taste acidic?

Butter is unlike most dairy products because butter is almost completely made up of fat. Fat is resistant to bacterial contamination.

Off-tasting butter is caused not by the fat but by the degrading of moisture and milk solids, which is why rinsing out all buttermilk is key in keeping butter fresh.

Ghee, with all milk solids and moisture removed, has a shelf-life similar to cooking oils.

Butter storage guidelines:

Keep salted butter on the counter freshest by bringing out what you will use in 7 to 10 days or less.

	SALTED	UN-SALTED
On Counter	0-10 days*	Not advised
In Fridge	2 months	2 weeks
In Freezer	9 – 12 months	4 – 5 months

Link: [2.1 Traditional Butter](#)

*At 70°F or cooler

[https://www.sciencedirect.com/science/article/pii/S1021949817301904#:~:text=According%20to%20Codex%20Alimentarius%20%5B2.%25%20\(m%2Fm\)](https://www.sciencedirect.com/science/article/pii/S1021949817301904#:~:text=According%20to%20Codex%20Alimentarius%20%5B2.%25%20(m%2Fm))



9 QUALITY BUTTER

Butter is made up of:

	Average	Range or Max
FAT	80-90%	80% Min. by law *
WATER	11-16% **	Max. 16% ***
Solids-Not-Fat	2%	1 – 3%
SALT (added)	0.5 – 2%	0 – 2.5%

* https://www.ams.usda.gov/sites/default/files/media/Butter_Standard%5B1%5D.pdf

** <https://core.ac.uk/download/pdf/128980216.pdf>

*** <https://www.sciencedirect.com/science/article/pii/S1021949817301904#tbl2>

Moisture content does not seem to be regulated in the U.S. anymore, though other countries as noted in link agree upon the 16% moisture limit which is where the term “European-style butter” popped up – higher fat, lower moisture butter.

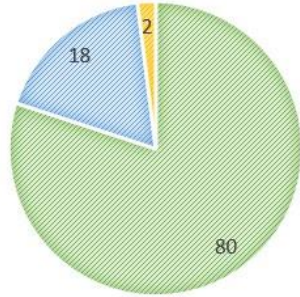
In a [study done by SFGATE](#), here are the average components of many common brands of unsalted butter:

Butter Components	Range
FAT	80.72 – 85.96
MOISTURE	12.59 – 17.78
Solids-Not-Fat	0.895 – 2.51

UNSALTED BUTTER COMPOSITION



- Fat
- Water
- SNF



Butter Scorecard:

	Desirable Traits:	Defects:
FLAVOR	Clean, sweet, fresh, mild, rich, creamy	Sour, weedy, barny, flat, fishy
BODY	Fine texture, waxy, uniform, spreadable, no water droplets visible	Salve-y, tallowy, loose, dry, wet, milky
COLOR	Even, straw colored, almost transparent, light	Mottled, streaked, cloudy
SALT	Fine, smooth, hint of flavor	Too much, not enough, gritty, mineral flavor
ODOR	Fresh, pleasant, delicate, mild or lacking any aroma	Strong, unpleasant, rancid

10 TROUBLESHOOTING

Problem:

Cause:

Butter comes out in a soft lump and is very greasy	Temperature of cream during churning was too high
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Solution: Start with cream at a lower temperature (40-50°F). Make sure churn is around 1/3 full of cream (if not enough cream, the air will warm up the small amount of cream too much during churning). Look for evenly-sized flakes or granular balls – and stop churning then - rather than waiting until the butter is one lump.

No matter how long the butter is worked, there is still a lot of buttermilk left in the finished product	Temperature of cream too high, causing buttermilk to incorporate into butter rather than separate out
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Solution: See above. Or, pour from churn into wire mesh strainer (line with a fine cheesecloth if granules are tiny) and gently wash back and forth at a cold enough temperature to remain granular. Wash until water comes out bottom clear.

<p>Butter sours quickly after being made</p>	<p>Too much of non-fat portions of the cream are left in the butter after being washed/worked or too little salt applied.</p>
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Solution: Wash thoroughly in the granular stage. Work thoroughly (there should be no moisture excreting out from the worked butter). Spread worked butter out flat, evenly salt, and incorporate by kneading. Can also lay out flat on wax paper, store wrapped. Only keep out what is used in a day or two or freeze for cooking. Can also pre-freeze cream.

<p>The cream churns forever before turning to butter</p>	<p>Cream too cold or too light OR too much cream in churn OR cream from unhealthy animal</p>
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Solution: Warm hard cream to 50-60°F before churning. This can be done by leaving the jar out of the fridge for a few minutes before churning or by warming on stove.

If using thin cream, try to use thicker cream via cream separator or freeze-thaw method or by only skimming the top half of the cream off the container for butter (use the bottom light cream for your coffee). Or, double skim by skimming a large amount, then let the cream set another day in the fridge, then skim the cream and use the top 2/3 for butter and the bottom 1/3 for other use.

Fill the churn about 1/3 full for maximum agitation – to speed up the quickness of turning to butter.

If the cow is very late lactation or possibly sub-clinical mastitis, cream may not churn. Check for signs of excessive yeast (bubbly, ferment-y milk) or bacteria (CMT or SCC, or culture test).

<p>The cream turns quickly to butter, but a lot of cream is left in the churn.</p>	<p>Cream too thick</p>
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Solution: Use a thinner cream, as super-thick cream will stick to the walls/paddles and will not agitate, therefore will not transform to butter. A certain level of buttermilk is necessary (preferably at least a cup out of a quart of cream) for churning.

<p>The butter is rock-hard and very un-workable and difficult to incorporate salt</p>	<p>Cream too cold, making the butter very hard and excreting out a larger portion of the liquid.</p>
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Solution: Warm cream to ideal temperature before churning.

Warm butter a touch before working to make the fat more pliable.

Call this “super butter” and charge more for it since the butterfat content is likely higher!

<p>There are white curd-like particles in the butter</p>	<p>Cream aged too long OR Cream splatter from churn attached to butter when poured out for rinsing.</p>
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Solution: If this happens, wash the butter several times to remove the white particles. It can be salvaged, at least as cooking butter.

Next time, use fresher cream, as over-aged cream will become acidified to curd form and the curd will incorporate into the butter, causing defect (causing the butter to go rancid quickly).

Or, wipe down sides of churn better while in the whipping phase just before the cream breaks.

Or, wipe down the sides more completely before pouring off buttermilk and butter.

<p>The cream solidifies and is not agitated, so butter does not form</p>	<p>Cream is too thick OR Too cold</p>
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Solution: Add light cream, milk, or water to thin the cream and produce agitation. Warm cream to 55-60°F before churning.

<p>Gritty butter</p>	<p>Undissolved salt</p>
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Solution: Use a finer salt, add less % salt, or work to distribute salt more completely.

RESOURCES

“With enough butter, anything is good!” – Julia Child

McKay and Larson. “Principles and Practices of Butter-making.” Second edition. John Wiley & Sons, London: 1911.

University of Guelph, Food Sciences, Dairy Science and Technology eBook: Butter Manufacture:

<https://www.uoguelph.ca/foodscience/book-page/butter-manufacture>

<https://www.usdairy.com/news-articles/new-study-found-butter-may-improve-how-the-good-cholesterol-hdl-works>

<https://www.usdairy.com/news-articles/more-evidence-backs-butter>



ABOUT THE AUTHOR



Michelle Lancaster is an avid learner and lifelong farmer. Her dairy career started in 2004 with two Jersey cows. Then she married a dairy farmer and became immersed in cheese courses, farming, and buttermaking. She has researched the science behind buttermaking for years and believes anyone can make butter with a few simple tips. Happy Buttermaking!

