



Presents

Introduction to Cheesemaking



Instructor
Kim Mack

Welcome to a whole new world – the World of Cheesemaking!

This class is an introduction to the basics of cheesemaking. This handout will serve as a good reference as you start on your cheesemaking journey. To follow is basic information on the equipment & ingredients you will need, the cheesemaking process, websites where you can find supplies and equipment, recipes and basic cheesemaking terms.

Contact Information

Kim Mack: (916) 524-1420

kimjoanmc@att.net

Facebook -<https://www.facebook.com/kim.mack.1840> or

The Scratch Made Life Facebook page

Website: www.scratchmadelife.com

Scratch Made Life Group

I have set up a Group on Facebook for people who have taken Scratch Made Life classes. It is simply called “Scratch Made Life Group”. This has been set up for you to share your successes, ask questions, talk about challenges and toss around things with this group. I do moderate the group and will be participating in the discussions as well.

Scratch Made Life YouTube Channel

Yes, there is a Scratch Made Life YouTube channel – please subscribe! You will find videos on various parts of the cheesemaking process as well as how to make a variety of different cheeses. And, there are more than just cheese videos there!

Making Homemade Cheese is Easier Than You Think!

It is easy and fun to make cheese at home. The most basic cheeses require only a few ingredients and tools. Basic cheesemaking is surprisingly forgiving and is a very rewarding and simple process. Most cheesemaking “failures” are still edible and tasty! So enjoy whatever you create and make adjustments on the next attempt.

When starting out there are three basic components to think about, ingredients, equipment and the process.



Basic Equipment List for Beginners

- A Large Stock Pot with Lid – Many cheese recipes require 2 gallons of milk plus an additional cup of ingredients so your stock pot needs to be large enough to accommodate with extra room for comfortable stirring. Stainless steel is the preferred material and a stainless steel pot with a reinforced bottom is even better. Avoid pots made of aluminum and other reactive materials as they are porous and bacteria can hide in the material no matter how much you clean. Note that if a pot is advertised as 2 gallons that is right to the very top rim of the pot so if you want to make a 2 gallon batch you'll need a 3 gallon pot.
- Thermometer – The thermometer for cheesemaking must be reliable and accurate. Some have a handy clip for attaching to the side of your pot which is a nice feature for cheesemaking. You will need a thermometer that goes from 75 degrees F to 185 degrees F.
- Measuring Spoons– Stainless steel measuring utensils are preferable because they are non-reactive and easy to clean. Your spoons should include 1/64th through 1/2 teaspoon.
- Cheesecloth – Cheesecloth is used to drain the whey from the curds and many other tasks in cheesemaking – now you know why it is called cheesecloth. 90 grade cheesecloth is recommended for 99% of your cheeses.
- Colander/Strainer – A colander is used for draining whey from cheese curds. Any non-reactive material will work. As with other equipment, avoid aluminum and other reactive materials, even when lined with cheesecloth – stainless steel is always the best way to go. (Keep a large bowl handy to catch your whey and use for other yummy and healthy things.)
- Slotted Stainless Steel Spoon – This is the best type of spoon you can have to give your milk a good stir and to stir in your ingredients. A spoon that is all one piece is best because there are no nooks for bacteria to lodge. Also there are slotted spoons sold where the bottom part of the spoon is bent so that you can stir up and down, which is how we stir in cheesemaking.
- Cheese Molds – You do not need to buy cheese molds if you don't want to, you probably already have items in your kitchen that will work. Just ensure that you are avoiding aluminum and other reactive materials (sensing a theme?). If you are going to make them yourself, at least to start with, you will need to ensure there is a way for the whey to drain. When I first started I used small springform pans, lined them with cheesecloth and placed that on top of a piece of plastic canvas used for embroidery.

- Cheese Press – A cheese press is used to press whey out of cheeses that are going to be aged. You can spend a lot of money on a complicated cheese press but *don't*. A great first cheese press is two five gallon buckets that fit inside each other. The bottom bucket you put the cheese into sitting on some sort of drainage vehicle - I use the rack from my Instant Pot. The top bucket you place on top of the cheese mold and fill with enough water to achieve the desired weight. A gallon of liquid weighs about 8 pounds so this “press” is great for any cheese up to 40 pounds of pressing weight, which is a great majority of them. You can get creative with other things you have in your home, just make sure they are clean and the whey can drain from the cheese.



Press using 5 gallon buckets



Homemade press using free weights

- Cheese “Cave” – Cheese was traditionally stored for aging in a cave because the temperature tended to stay consistent year around in the 52-55 degree F range. Today we don't actually have caves but that is what we call them. The most common cave used by home cheesemakers is a wine fridge or other small refrigeration unit that can achieve a temperature in the range of 52-55 degrees F. If you don't have access to this right away you can use your regular refrigerator but the aging process will take a bit longer. You can speed it along some by “walking your cheese”. This is when you take it out of the refrigerator and put it on the kitchen counter for several hours several times a week. This will make the process speed up a bit and allow you to stay within the aging time if you are aging in a regular refrigerator. This is not needed until you start making aged cheeses.

Basic Ingredients for Cheesemaking

- Milk - Milk is, obviously, the most important ingredient in cheesemaking and there are many options out there for you to choose from. Cow's milk, goat's milk, sheep's milk. Raw milk, pasteurized milk. Homogenized or not Organic milk or grocery store milk. The most important thing to remember when deciding what milk to use:

NEVER, EVER USE ULTRA PASTEURIZED or UP MILK, this will not work.

You will find the perfect milk for you. You also may find that you prefer one milk for one kind of cheese and a different milk for others. Remember – the more processes done to the milk the less likely it is to work for cheese making.

Raw milk is the best because it has been left just the way it came out of the animal. Store bought raw milk is very expensive. If you are lucky enough to have a source for raw milk ensure that it is a trusted source. Because nothing is done to the milk to kill any bad bacteria you want to ensure that the gathering process is very clean.

Pasteurized milk is milk that has been heated to kill any bad bacteria in the milk. Problem is that it also kills some of the good bacteria that is needed for cheesemaking. It also destroys some of the calcium and proteins that are needed to create a good curd. Fortunately, a starter culture can be added to get the good bacteria going that will add a nice flavor to your cheese and calcium chloride can be added to help fix some of the damage done to the proteins in the milk during the pasteurization process.

Homogenized milk is milk where the cream that gathers at the top and the liquid of the milk are mixed together and processed to stay together. The majority of the milk that you find on grocery shelves is milk that has been pasteurized and homogenized.

Ultra-Pasteurized Milk is milk that has been heated twice. The second heating of the milk destroys the wonderful things in milk needed to make a good cheese to the point that it is not suitable to be used in cheese making.

Organic Milk is fine for cheese making as long as it is not Ultra-Pasteurized, which a lot of it is. The reason is organic milk tends to sit on the shelf longer and UP milk has a longer shelf. So read the label carefully when looking at organic milk.

Whole Milk vs. Low Fat Milk vs. 1% vs. Skim Milk – Unless the recipe calls for a specific fat percentage, always use whole milk for cheesemaking.

Cow's Milk vs Goat's Milk vs Sheep's Milk - Different cheese recipes call for different types of milk to make them that “true” cheese. Traditionally cheddar is made with cow's milk, Chevre is made with Goat's milk. Manchego is made with sheep's milk. However, you can change the milks and make a cheddar with sheep's milk or a Manchego with cow's milk. The flavor that you are used to will be a bit different but you can definitely do it.

Freezing Milk - **YES** you can freeze your milk, thaw it out and use it for cheesemaking. Sheep's milk freezes wonderfully and you will not see any change in your end product when using sheep's milk that has been frozen.

Cow's and goat's milk will work after thawing as well and work great for cheesemaking but you may see a very slight loss in yield. You can freeze it longer but I prefer to use frozen milk within 60 days of freezing.

- Starter Culture – Starter cultures are friendly bacteria that help “ripen” your milk by increasing acidity levels. There are many different types of cheese culture available. They are usually sold in powder form and consist of a specifically selected group of bacteria that cause acidification, making your milk the perfect environment for good bacteria growth and flavor development. The cheese starter culture used determines the taste, texture and aroma of the final cheese. Cheese cultures are often grouped by the temperature range at which they work.
 - **Mesophilic** means medium-loving, indicating that it will propagate best at temperatures up to 90 degrees F. A great all around generic meso culture is MM100.
 - **Thermophilic** means heat-loving and is added to milk heated to higher temperatures. Thermo culture to have on hand for all around use is either Thermo B or Therm C.
- Calcium Chloride – This is an optional ingredient in cheesemaking but is good to use when using store bought milk. The heat treating process most commercial milk goes through decreases the amount of calcium leading to a less firm curd. Adding the calcium chloride replenishes some of the calcium and leads to a firmer, more successful cheese curd. Adding calcium chloride to your brine also helps whether you are using raw milk or not, it keeps your curds solid. Sometimes while in the brine the outside of your wheel of cheese will become “slimy” if you do not put calcium chloride in your brine. This “slime” is okay, you just need to wipe it off but that means you lose a bit of your cheese.
- Citric Acid – Citric acid added to milk raises the acidity level which is an important step in cheesemaking. Lemon juice or vinegar can be used instead of citric acid some of the time.
- Coagulant (Rennet) – Coagulants are added after the starter culture and are used to solidify milk proteins into cheese curds. The most common coagulant is animal rennet but vegetable rennet is available as well and is what I use. They come in both liquid and tablet form with the liquid being the easiest to use. Rennet can come in single and double strength so read your labels and recipes. The vast majority of recipes are written to use single strength rennet.
- Salt – Salt is a natural preservative and a very important element in cheesemaking, not only for flavor. You do not have to use special cheese salt. **Non-iodized kosher salt** is the best to use but any salt without iodine

will work just fine. Iodized salt harms and inhibits bacterial growth and well-being that is essential to good cheesemaking. It can also slow the aging process drastically.

- Water – In cheese recipes where rennet and/or calcium chloride are used it calls for those ingredients to be diluted in water and then put into your milk. The reason for this is it helps to get a more even distribution of the ingredient through the milk for a better outcome. I mention water because it is very important to know – DO NOT USE CHLORINATED WATER. Chlorine can cause the same harm that iodine can cause, it can kill the good bacteria needed to make the good flavors in your cheese.
- Additional Ingredients - There are mold powders, b linens, the culture used to make Swiss cheese, tartic acid, annatto and many others. These are used in cheeses that are intermediate to advanced but it is good to be aware of them.

Basic Steps to Cheesemaking

THIS IS NOT A RECIPE! Please reference your specific recipe(s) to learn the ingredients and procedures needed for the style of cheese(s) you want to make. This section is intended as a basic introduction to the basic steps of cheesemaking.

- Clean and sterilize both your equipment and surface. For an easy way to sterilize equipment, fill your cheese pot with water, toss in any heat safe submersible equipment and will fit, place the top on your pot, bring the water to a roaring boil and maintain boil for at least 15 minutes.
- Heat milk slowly and evenly to temperature as specified by your recipe, remove from heat and add starter culture.
- Allow bacteria in the culture adequate time to grow in your milk, consult your recipe for the exact time for the cheese that you are making. This “ripening” period varies by culture and type of cheese. It is during the ripening period that the pH of your milk begins to drop and flavors are beginning to develop.
- Add diluted calcium chloride (optional but strongly recommended when not using raw milk, assists with curd formation when using store-bought milk) and then diluted rennet as directed by your recipe. This will cause the curd to form and begin to separate from the whey. Allow milk to coagulate completely per your recipe. You do not need to use this when working with raw milk but it is a must use with pasteurized milk. If your recipe doesn't call for it use the same amount as the recipe calls for rennet and always add the calcium chloride prior to adding the rennet.

- Check for a clean break. When a clean break is achieved that means that your curds have set up and are ready to go to the next step of cutting them. You check for a clean break by making a small impression in the top of the curd, I like to do this in the center of the pot, releasing the curd and seeing if the hole you made fills with a clear liquid. If it does you have achieved a “clean break” of the curds and whey. If your whey is cloudy, put the lid back on your pot and let it sit for a bit more per your recipe.
- Cut the curd: With a long knife, gently cut your curd mass into equal -sized cubes. This is easily achieved by cutting in two directions at a 45° angle. This is done to help expel whey. Allow cut curd to “rest” (heal) for a bit; this resting time allows the curds to release more whey and to toughen up somewhat.
- Cooking the curds. The process of cooking curds helps them expel whey, firm up and reach the desired acid levels. You will notice the curds get smaller and form a more solid texture the longer they cook. Not all cheeses require this step.
- Drain whey off of curd. This is done many different ways, but for fresh, unpressed cheeses this is usually achieved by ladling curd into cheesecloth-lined forms. Allow to drain naturally. You may wish to save the drained whey, as it can be used for many things. The curds will compress under their own weight as the whey drains, so fill your forms to the very top — you can expect the mass to shrink as it settles in. Allow to drain for the amount of time specified by your recipe.
- Molding and Pressing. This is done to form your cheese and expel the last of the whey. Different cheeses require different weight and time for pressing.
- Remove your cheese from the form and allow it to dry on a sanitized draining mat. Note that this part of the process varies significantly between the different types and styles of cheese. Some cheeses are brined after being removed from the mold.
- Aging your cheese. Not all cheeses are aged. Cheeses that are not aged are called fresh cheeses – ricotta, queso fresco, feta and several others. Cheeses that you do age are cheeses such as Parmesan, Gouda, Cheddar, harder cheeses. Your recipe will give you the aging time and conditions. There are multiple ways to age your cheese. Some of the most common types of aging used by home cheesemakers are listed below.

- **Natural Rind** - This type of aging will give your cheese a nice thick rind. When it is ready to start aging you place the cheese into an aging container on a drying mat so that air can circulate. You either rub it with olive oil or use a brine wash to combat mold growth. This is a much more traditional way of aging your cheese. It takes a good deal of attention but if you like a nice rind on your cheese this is the way to go.
- **Vacuum Sealing** - This is used very effectively but a good many home cheesemakers. When the cheese is ready for the cheese cave you put it in a vacuum sealed bag and seal it up. Place it in the cheese cave and flip it every few days examining for mold in case the seal breaks. No need to worry about humidity. Cheese does age when vacuum sealed and is a great way - especially for a beginning cheesemaker - to age cheese.
- **Waxing** - Many modern day cheesemakers age their cheese by waxing. It works very much like vacuum sealing. Once in the wax you don't have to worry about humidity in the aging process and it is a fairly full proof way to combat unwanted mold growth. Waxing can be messy and a little pricey but it is pretty. One problem with waxing vs vacuum sealing is that you can't see if there is any mold development which can happen if air somehow got into the cheese, where you can with the vacuum seal.
- **Bandaging** - For bandaging you use a few layers of cheesecloth covered with a fat such as lard or butter to coat your cheese. Mold will feed on the fat in the bandaging versus your cheese so the bandaging process protects your cheese from mold by growing mold in the cheesecloth. Cheeses that are bandaged do tend to develop a more sharp flavor and are generally used for cheeses such as cheddar that are aged for extended periods of time.

Sanitizing Your Work Area

We all know that when preparing food cleanliness is very important. However, cleanliness before, during and after making cheese is even more so for health reasons and for the success of your cheese. Making cheese relies largely on bacteria working to change and flavor the milk. But, these bacteria must be the right kind of bacteria from cheese cultures and fresh milk, not the bacteria found in unsanitary surfaces or equipment.

Bleach is the end all of cleaners but when cleaning my area for cheesemaking I may start with the bleach but I finish with a mixture that is ½ vinegar and ½ dish soap. This is a great cleaner and will clean any residue left of the bleach. Bleach in cheese wouldn't be a great flavor.

Obtaining Your Supplies

Starter Culture? Rennet? Where the heck do I find those you ask. To follow are a list of websites for your reference where you can find ingredients, equipment, recipes and/or helpful information for cheesemaking.

- New England Cheesemaking Supply Co.
<https://cheesemaking.com/>
- Cultures for Health
<https://www.culturesforhealth.com/>

And, of course, there is always Amazon where you can find basic cheesemaking equipment and ingredients. **Beware of the kits**, however, as they tend to have items in them that you really don't need and just end up costing you extra money.

Ricotta Cheese Recipe

Ricotta is a versatile fresh Italian cheese and a great starter cheese. Traditionally it is made with whey from the cheesemaking process but because so little whey is made by the home cheesemaker this isn't practical for more than ½ cup or so. To follow is a recipe for a nice, creamy ricotta that can be used in both sweet and savory recipes.

1 gallon whole milk
1 teaspoon salt
1 cup heavy cream (optional)
1/3 cup white vinegar or 6 tablespoons fresh lemon juice

1. In a large pot, add the milk, salt and heavy cream (if using). Directly heat the milk to 180-185. Stir often to prevent scorching.
2. As soon as the milk hits temperature, turn off the heat and add the vinegar or lemon juice. Stir for about 2 minutes to get a good separation of the curds and whey. If the milk doesn't start to separate in the first minute, add a bit more of your vinegar or lemon juice – about a tablespoon as a time – until the curds and whey separate.
3. Line a colander with cheesecloth. Carefully pour pot contents into the colander and drain for 10-30 minutes, or until the cheese has reached the desired consistency. Or, you can put the curds into a cheese mold and let drain for about 30 minutes. The cheese is ready to eat immediately.
4. Store in a covered container in the refrigerator for 1-2 weeks.

Queso Fresco Cheese Recipe

Queso fresco is a Mexican cheese whose name literally means “fresh cheese.” Queso fresco is a type of queso blanco, or white cheese, made from cow's milk alone or from a combination of cow and goat milk, and acidified with rennet, lemon juice, or vinegar.

1 gallon whole milk
1/3 to 1/2 cup white vinegar
1 tablespoon apple cider vinegar
2-3 teaspoons kosher salt

Pour milk into a stainless steel pot. On medium heat bring milk to 170 degrees, stirring constantly to avoid scorching. When milk reaches temperature, remove from heat and add the apple cider and white vinegars. Stir and you should see immediate separation of the curds and whey. If this doesn't happen add about 1 additional tablespoon at a time of the white vinegar until separation of curds and whey occurs. Stir for about a minute.

Let curds and whey sit for about 5 minutes and pour into cheesecloth lined strainer. Drain the curds for about 15 minutes. Place into a bowl, add salt and “mill” the salt into the cheese – this is the action of using your hand to stir in the salt. At this point you can either drain via cheesecloth for 10-15 more minutes or you can place into a mold, top with follower and put 1-2 pounds of weight on top for 10-15 minutes.

Remove from cheesecloth and put in a bowl, refrigerate. Or, remove from mold and store in the refrigerator in an appropriate air tight container. This cheese should keep for about a week.

Paneer Cheese Recipe

Paneer, or Indian cottage cheese, is a fresh cheese common in India made from cow or buffalo milk. It is a non-aged, non-melting soft cheese made by curdling milk with a fruit- or vegetable-derived acid, such as lemon juice.

8 cups whole milk
¼ cup freshly squeezed lemon juice

Bring milk to a gentle boil, about 185 degrees F, over medium heat stirring frequently so that the milk does not scorch. This will take a bit of time so be patient.

Once you reach the heat, add the lemon juice and turn the heat down to low. Stirring gently you should almost instantly see the curds and whey start to separate. If they do not add an additional tablespoon of lemon juice.

Remove pot from heat and slowly pour contents into a cheesecloth lined colander. Gently rinse the curds with cool water to get rid of the lemon flavor. Let drain for 10-15 minutes.

Grab the ends of the cheesecloth and twist until curds are in a tight ball. Place on a plate with the twisted part of the cheesecloth to the side and set another plate on top. Weigh the second plate down with a gallon container filled with warm water. Move to the refrigerator and let it sit for about 20 minutes.

Unwrap your cheese from the cheesecloth and it is ready to use! This will keep in the refrigerator for 3-5 days.

Glossary of Terms

Aging - The process of curing cheese in controlled environments to develop the microorganisms that accentuate the cheese flavors.

Brine - Brine is a solution of salt, water, and calcium chloride and is used in cheesemaking to salt and preserve aged cheeses. If a cheese is going to be brined this will happen after taking cheese out of the press.

Casein - The principal protein in milk. During the cheesemaking process, casein solidifies, curdles or coagulates into cheese through the action of rennet.

Cheddaring - The process used in making cheddar whereby curds have knitted into a slab and the slabs are repeatedly turned over and stacked to help drain additional whey from the cheese.

Clean Break - A clean break is when the curds and whey break “cleanly” from each other. You check for a clean break after the rennet setting time is complete. You do this by making a depression in your curds, releasing and watching to see if that hole fills with clean liquid.. If it does, you have achieved a clean break. A very important step in cheesemaking because it means your curds have set properly and you can move on in the process. Here are two pictures - one making the hole and the other where the whole has filled with clear liquid (whey).



Coagulation - The separation of the curds from the whey in cheesemaking.

Cooking - A step in cheesemaking during which the cut curd is heated to assist in whey removal from the curds.

Curds - A dairy product obtained by curdling (coagulating) milk with rennet or an edible acidic substance such as lemon juice or vinegar and then draining off the liquid portion (called whey).

Eyes - Small or large holes in a cheese.

Follower - the follower cheese mold after it has to press your cheese. You put that there is a mechanism weight of your press. It is because it follows the whey is expelled. Here is a picture of a mold and its' follower.



goes on top of your cheese mold after it has been filled with curds need the follower so in place to hold the cheese down as the picture of a mold and its' follower.

Fresh Cheeses – Style of cheeses that generally are not aged and made with pasteurized milk with high moisture content such as cottage cheese, mascarpone, crème fraiche, and yogurt.

Homogenization – Homogenization or homogenization is any of several processes used to make a chemical mixture the same throughout. The fat in milk normally separates from the water and collects at the top. Homogenization breaks the fat into smaller sizes so it no longer separates, allowing the sale of non-separating milk at any fat specification.

Knitting/Knit – The transformation of curds into cheese mass. The process of the curds “knitting” together during the pressing process.

Lipase - An enzyme found in raw milk. Used in cheesemaking to add a sharpness to cheese. Mostly used in the making of Italian cheeses.

Milling – The breaking up of the curd after it has rested and ripened before pressing. This term is generally used when you are going to “Mill” something into your cheese such as salt or some type of seasoning.

Pasteurization – The heat treatment of milk to kill harmful microorganisms/bacteria.

Pressing/Press – One of the steps in cheesemaking that uses pressure to achieve desired moisture content and texture by removing any whey left in the curds.

Rennet - An enzyme that aids in coagulating milk. It can be found in liquid or tablet form. Single strength and double strength (most recipes call for single strength so if you rennet is double strength use half as much). Rennet can be animal based or vegetable based. Animal rennet is made from the linking of calves' stomachs. Vegetable rennet is generally made from milk thistle.

Ripening/Ripen - A step in cheesemaking just after starter addition and before renneting in which the milk is allowed to undergo an increase in acidity, due to the activity of cheese starter culture bacteria. Sometimes the term ripening is used to indicate maturing. It is less confusing to use the term maturing in this context.

Rind - Outer coating of a cheese formed by surface drying, often treated by rubbing, brining, oiling, blackening or other methods to produce the desired characteristics. Natural rinds are usually edible.

Salting - A step in cheesemaking in which coarse salt is added to the curds before moulding, to the surface of the finished cheese, or by immersion in a brine solution.

Starter - A culture that is used to speed and control the process of curdling milk during cheesemaking. Its' role is also to start the process of producing good bacteria in cheese that makes flavor.

Surface Drying - Step in cheesemaking after cheese is either removed from brine or the press if not a brined cheese where the cheese is left on a counter at room temperature to dry. This is the last step before aging.

Ultra Pasteurization - The process of heating milk up once, reducing temperature and heating and reducing again. This is generally done to get a longer shelf life. UP milk cannot be made to make cheese.

Whey, - The liquid remaining after milk has been curdled and strained.

Yield - The amount of cheese that comes from the amount of milk used.