Home Cheese Making: Mozzarella

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The creation of cheese came from the very basic need of early humans to save and use milk. Cheese making has evolved to span many tastes and textures, from soft ricotta cheese to hard cheddar cheese to mold-ripened blue cheese. For the beginner, the easiest cheeses to make would be the softer ones, such as ricotta, or the ever-popular Italian cheese, mozzarella.

Delecious pizza made with mozzarella cheese.
Marie Hegler ©2017, Clemson Extension

While we tend to consider cheese as an ingredient itself, the fact is cheese is the delicious end product of a process that involves its on unique set of ingredients. Different bacterial cultures, coagulants, yeasts, molds, and enzymes are used to create all sorts of cheese varieties. Making cheese is both an art and a science, but just like any dish the key to making good cheese starts with the right ingredients.

Milk

Obviously, the first and most important ingredient needed in the art of cheese making is milk. Milk is made up of mostly water, seven-eighths to be exact, and the rest is known collectively as milk solids.

The breakdown of these milk solids is a combination of proteins (casein and whey), sugar (lactose), fat (butterfat), vitamins, minerals, and trace elements. The composition and characteristics of milk vary, depending on the where the milk comes from (i.e. cow, goat, sheep). While you can most certainly use different types of milk when making cheese, the results will create variations in the taste and texture.

Turning milk into cheese begins when the protein portion of milk solids (casein) coagulates, or curdles, to produce the curd. When curds form, they leave behind a liquid byproduct known as whey. In general, the fresher the milk the better the curd formation will be.

Regular milk found in the supermarkets or grocery stores is usually homogenized, meaning it has been heated and pressurized to breakup the butterfat globules so that they are evenly dispersed. These milks are also pasteurized, which means they have been heat-treated to destroy pathogens. Since high-temperature pasteurization (170 degrees or higher) and homogenization can all alter protein structure and inhibit proper curd formation, most milks found in your local grocery stores are not ideal for making cheese. Furthermore, ultrapasteurized (UP) and ultra-high pasteurized (UTP) milks are also not recommended for making cheese. These milks have been treated using even higher temperatures, and while this process helps to prolong their shelf life, they also damage the protein structure and destroy enzymes, which hinder the ability of proteins to coagulate into curds.

The ideal milk for good cheese making is farm, fresh milk that has been pasteurized at low temperatures as well as non-homogenized, meaning the cream has separated from the milk. Farmers'

markets, local dairies, and even some specialty grocery stores carry low-temperature pasteurized, non-homogenized milks. Raw milk can also be used, but there is an extra step in the cheese-making process to pasteurize it. Specifically, you would need to slowly heat the milk to 145°F and hold it there for 30 minutes.

Whole milk, which is milk that still has all of its original ingredients and a butterfat content of around 4%, is the most common milk used when making cheese. You can use nonfat or skim milk, which has most of the cream removed and a butterfat content of around 1 to 2%, for certain cheeses. In general, one gallon of milk yields about one pound of hard cheeses and two pounds of softer cheeses. This does vary depending on the type of milk used. For instance, goat's milk and skim milk will make a little less while sheep's milk will produce a little more.

Rennet

There are a couple of ways to cause milk to coagulate into curds and whey and, thus, make cheese. One is the use of rennet a substance that is produced naturally in the stomachs of unweaned grazing animals, such as calves and lambs. Rennet contains enzymes that cause milk protein (casein) to separate the milk into curds and whey (liquid). Early cheesemakers produced rennet by slaughtering a calf, cleaning and salting the stomach, and hanging it up to dry. Then when making cheese, a small piece of the dried stomach was pinched off, soaked in water, and added to milk to produce curd. Today, you can purchase rennet in liquid, tablet, or powdered form. It also comes in both animal-derived and vegetable-derived forms. Rennet in all its forms can usually be found online at cheese-making supply sites.

Acids

While rennet is used to help the coagulation of most cheeses, various acids my also be used when making soft cheeses. Vinegar, citric acid, tartaric acid, and lemon, lime, and orange juices, help bring milk to the proper acidity for coagulation. Food-grade citric acid can be found in many well-stocked supermarkets, often near canning-related items, as well as online.

Distilled Water

Chlorine can destroy the action of rennet, so non-chlorinated water should be used to dilute rennet. Rennet is diluted with water because it is so powerful and fast acting that dilution is the best way to ensure it mixes evenly into milk before coagulating. If your source of water is municipal, check with the local water department to find out if it chlorinates the water supply. If so, non-chlorinated bottle water or distilled water can be purchased form grocery and other stores.

Cheese Salt

Like most things, salt enhances the flavor of cheese. Cheese salt is a coarse, non-iodized, salt similar to canning salt. It is usually added to the curd being pressed or stretched. It helps draw moisture from the curd, drain the whey by causing the curd to shrink, inhibit the growth of lactic bacteria towards the end of the process, and act as a preservative. You can purchase cheese salt form cheese-making supply companies online. However, do not use iodized salt because the iodine inhibits the growth of starter bacteria and slows the aging process in some cheeses.

The ever-popular Italian cheese, mozzarella.
Marie Hegler ©2017, Clemson Extension

Quick Mozzarella

Ingredients:

1 gallon milk (low-heat pasteurized and non-homogenized)
1¼ cup cool water (chlorine-free)
1½ teaspoon citric acid
¼ rennet tablet (¼ teaspoon if using liquid rennet)
1 teaspoon cheese salt (optional)

Equipment:

1-gallon thick-bottomed stainless steel pot
Dairy thermometer
Colander
Slotted spoon
Long-bladed knife
Microwavable bowl
Rubber gloves (optional)

Instructions:

1. Remove all sponges, cloths, and dirty towels away from work surface and wipe your sink and stove with soap and water. Use an antibacterial cleaner to wipe down all surfaces.
2. Crush ¼ tablet of rennet and dissolve in ¼ cup of cool, non-chlorinated water. Set aside to use later.
3. Add 1½ teaspoon of citric acid into 1 cup cool, non-chlorinated water and pour into a large stainless steel pot. Stir in cold milk.
4. Heat milk slowly to 90°F over medium-low heat while frequently stirring.[1] Remove the pot from heat and slowly add your rennet to the milk. Stir in an up and down motion for approximately 30 seconds. Cover pot and leave it undisturbed for 5 minutes. Check for curd formation after 5 minutes. It should look like custard, with a clear separation between the curd and whey.[2]
5. With a long-bladed knife, cut the curds into a 1-inch grid. Place the pot back on the stovetop and heat to 105°F while slowly stirring the curds with a spoon. Remove from heat and continue stirring slowly for 2 to 5 minutes.
6. With a slotted spoon, scoop curds into a colander or microwave safe bowl (if the curd is too soft at this point let it sit for another minute). Once transferred, press the curd gently with your hand (use gloves if too hot), pouring off as much whey as possible. Transfer curds to a microwave-safe bowl. Microwave on high for 1 minute. Remove and drain off all whey. Gently fold the curds with a spoon and then when slightly cool, use hands to fold the curds into one piece. Microwave two more times for 35 seconds each, and repeat the folding to drain off all the whey and ensure even heating of the curds.
7. Add salt near the finish. At this point, if hot enough, the cheese should be soft and pliable enough to stretch (like taffy).[3] Knead the cheese by stretching and pulling until smooth and shiny. Return to the microwave if it begins to cool before ready to stretch.
8. Form cheese into a log or ball or braid it. Then submerged it in cold water for 5 minutes followed by an ice bath for about 15 minutes.[4] Eat when cool or wrap and store in fridge for a few days. **Yield:** about ¾ pound

Notes

[1] If you're having problems with milk forming a proper curd, you may need to increase this temp to 95°F or even 100°F.
[2] If the curd is too soft or the whey is milky, let set for a few more minutes. If the milk did not form a curd, check the kind of milk used.
[3] If the curd just continues to break and tear, you most likely have a problem with the milk used.
[4] This step is critical as it protects the silky texture and keeps it from becoming grainy.

Source:

1. Carol, R. (2002). Home Cheese Making: Recipes for 75 Homemade Cheeses. Storey Publishing, LLC, MA.

Prepared by Marie Hegler, Area Food Safety and Nutrition Agent, Clemson Extension, Clemson University, 12/17.