University of California Cooperative Extension
Master Food Preserver

CHEESEMAKING

The recipes included in this handout are recommended for beginners. These are soft cheeses and require little equipment to produce. They are eaten fresh, requiring no long aging times. These cheeses must be kept in the refrigerator and will keep for about one week.

FOOD SAFETY CONCERNS

There are four major pathogens associated with fresh cheese that can cause foodborne illness. They are: *Salmonella, E. coli, Listeria monocytogenes*, and *Staphylococcus aureus.* These pathogenic bacteria are controlled by good sanitation of equipment and food contact surfaces, proper cooking, cooling and handling of cheese curds during processing, and proper hand washing.

ESSENTIAL TOOLS/EQUIPMENT

1. Large stock pot, generally 6 to 8 quarts. The pot should be stainless steel or unchipped enamel. Avoid pots made of aluminum or other reactive metals.
2. Thermometer, digital or a candy thermometer. Make sure the thermometer goes low enough for your recipe as some candy thermometers start at 200°F.
3. Measuring spoons and cups, stainless steel, glass or plastic.
4. Long–handled spoon and slotted spoon. You need a spoon for stirring as well as a spoon to remove the curds from the whey. They can be stainless steel, plastic or nylon. However, stainless steel is the easiest to clean.
5. Large bowl for catching drained whey.
6. Cheese cloth, butter muslin or flour sack towel to drain the curds.
7. Colander or strainer made from any non-reactive material (plastic, metal, enamel). As with other utensils, avoid aluminum or other reactive material, even when lined with cheesecloth.

Clean and sterilize all equipment before and after cheese making. Most home cheese making failures are caused by unclean or unsterile equipment. When finished with a utensil, rinse it thoroughly with cold water. Then wash it in hot water with a good dish-washing detergent. Rinse thoroughly in hot water.

SANITIZATION

You must sterilize your equipment before use.

1. Boil all cheese-making equipment for 5 minutes or soak all cheese-making equipment in a bleach water solution for 2 minutes.

   Bleach water solution:
   - 1 gallon of water
   - 2 tablespoons household unscented bleach
2. Reuse cheese cloth, butter muslin or flour sack towel only if they have been sanitized.

CLEANING AND REUSING CHEESECLOTH OR BUTTER MUSLIN

If the cloth is only used to drain curds, it will not be as difficult to clean as if it is used to press or age cheese for a long period of time.

How to Reuse Cheesecloth or Butter Muslin:

1. Rinse immediately after use.
2. Wash in the washing machine or by hand in the sink.

3. Avoid detergents and fabric softeners. Use only mild detergent if necessary, and rinse thoroughly to remove any soap residue.
4. If there are bits of curd sticking to the cloth, rinse with whey or white vinegar to help remove it.
5. For sterilization, boil the cheesecloth or butter muslin for about 5 minutes or soak it in the Bleach Water Solution. If soaking in bleach solution, rinse thoroughly before hanging it out to dry.
6. As soon as the cheesecloth or butter muslin is dry, fold and store in a zipper-style plastic bag until ready to use again.

MILK

Milk is a complicated substance. Seven-eighths of it is water. The rest is proteins, minerals, milk sugar (lactose), milk fat, vitamins and trace elements. As a result, variation in the quality of cheese does occur, depending on the type of milk used. When we make cheese, we cause the protein part of the milk to curdle. Cheese can be made from whole milk, 2%, 1%, skim milk or reconstituted milk powder. Whatever type of milk used, it should always be pasteurized. The fresher the milk, the better the cheese.

- ***Raw milk*** is that which is collected from a dairy animal and *not processed further.* **It may contain harmful bacteria.** Raw milk should be pasteurized before it is used in the production of soft cheese.
- ***Pasteurized milk*** is milk that has been heated to destroy all pathogens. All milk purchased in the store has been pasteurized.
- ***UT (Ultra-Pasteurized) or UHT (Ultra High Temperature) pasteurized milk*** is milk that has been heated to 191° to 212°F and 280°F respectively to kill bacteria and extend shelf life. Avoid using this milk as this process changes the protein structure of the milk, preventing it from separating into curds and whey.
- ***Homogenized milk*** is milk that has been subjected to a process that breaks up the fat globules so that they will no longer separate from the milk. Most milk purchased at the store has been homogenized. You can use homogenized milk to make cheese.
- ***Whole milk*** is pasteurized milk with 3.25% fat (by weight)
- ***Skim milk*** is milk that has had some or all of its fat removed.
- ***Homogenized milk*** is milk that has been subjected to a process that breaks up the fat globules so that they will no longer separate from the milk. Most milk purchased at the store has been homogenized. You can use homogenized milk to make cheese.
- ***Milk Powder*** can be reconstituted and used in cheese making.

PASTEURIZATION

Pasteurization destroys most disease producing organisms and limits fermentation in milk, beer and other liquids by partial or complete sterilization. The pasteurization process heats milk to 161°F for 15 seconds, inactivating or killing organisms that grow rapidly in milk. Pasteurization does not destroy organisms that grow slowly or produce spores. While pasteurization destroys many microorganisms in milk, improper handling after pasteurization can re-contaminate milk. Raw milk can also be pasteurized on the stovetop. **Microwaving raw milk is not an effective means of pasteurization because of uneven heat distribution.**

How to pasteurize milk

Milk must be heated, with agitation, in such a way that every particle of the milk, including the foam, receives a minimum heat treatment of 145°F continuously for 30 minutes or 161°F for 15 seconds. The temperature should be monitored with an accurate metal or protected glass thermometer. Commercial operations commonly use a high temperature, short-time process in which the milk is heated to 170°F for 15 seconds and then cooled immediately to below 40°F to increase storage life without any noticeable flavor change in the milk.

Pasteurization of fluid milk has very specific requirements for time and temperature as listed in the chart.

Temperature-Time Pasteurization Temperature-Time Requirements for Fluid Milk

Temperature	Time
145°F	30 minutes (vat pasteurization)
161°F	15 seconds (high temperature, short time pasteurization)
191°F	1 second (Higher-Heat, Shorter Time)
212°F	0.01 second

CHEESE SALT

Cheese salt is merely a salt that is non-iodized. Iodized salt harms and inhibits bacterial growth and well-being that is essential to any good cheese-making. You can use any non-iodized salt in cheese-making. Salt is important in a number of cheese-making steps: it adds to the flavor of the cheese, it helps to dry the curds during draining and it will help to kill bacteria and other harmful growth when used as a brine.

WHEY

Whey is the yellowish liquid left over when you make various cultured milk products. There are actually two kinds of whey, and they have different uses.

1. ***Acid Whey***

   Acid whey is the liquid produced from making more acidic cultured dairy products such as paneer, feta, chevrè, or *whole milk ricotta.*

   Uses for Acid Whey

   - Soak grain in acid whey for making breads.
   - Feed acid whey to animals. They may like sweet whey better than acid whey. Whichever kind you feed them, be careful, because it can upset their digestion if they consume too much. Cats should not be feed whey.

2. ***Sweet Whey***

   Sweet whey is the liquid that is produced when making hard cheese like cheddar or *most soft cheeses.*

   Uses for Sweet Whey:

   - Use sweet whey the same way you use acid whey
   - Add it to smoothies and shakes to provide more vitamins, minerals, and proteins.
   - Use as cooking liquid for potatoes, rice, grits, pasta, and grains.
   - Drink it straight!
   - Make whey cheeses.
   - Put it in your compost pile. It adds nutrients and makes thick, black compost.

Whey may be frozen up to 3 months until used.

TESTING THE ACCURACY OF A THERMOMETER

It is important to test the accuracy of your thermometer and make any necessary adjustment to assure your final product is neither over- or under-cooked. Here is a quick and easy method to test the accuracy.

1. At sea level, water boils at 212°F. With each 500-feet increase in elevation, the boiling point of water is lowered by just under 1°F. At 2,500 feet, for example, water boils at about 207°F. Determine your elevation and then refer to the chart below to determine the temperature at which water should boil at your elevation. This will be your baseline.
2. Insert the thermometer into a pot with at least 2 inches of water and bring the water to a rolling boil. The amount of water needs to boil for at least 10 minutes. The bubbles should be constant and vigorous. Leave the thermometer in the water for 10 minutes to give it time to get an accurate reading. Make sure the bulb of the thermometer is fully immersed in the water the entire time and that it is not touching the bottom or sides of the pot—this can give a false reading.

3. Inspect the temperature on the thermometer making sure you are eye level with the thermometer and not looking at it from an angle. If it is 212°F (or the corresponding temperature for your elevation shown in the chart, below), your thermometer is accurate!
4. If the thermometer is off by a few degrees or more, take this temperature difference into account when doing all future cooking with the thermometer. For instance, if you are at sea level and your thermometer registers 215°F when inserted in boiling water, you know that your thermometer reads temperatures 3° hotter than it should. If you have a recipe that calls for a temperature of 220°F, you need to add 3° and reach 223°F on your thermometer. On the other hand, if you are at sea level and your thermometer registers 210°F in boiling water and your recipe calls for a temperature of 220°F, you will need to reduce that temperature by 2° (the difference between the actual reading and the temperature at which water should boil at sea level). Make a note of the inaccuracy so that you can easily remember the " thermometer adjustment" required for your elevation.
5. Perform this test on a regular basis, to ensure that your conversion is still accurate. Make a note of the adjustment that needs to be made either on the thermometer with a Sharpie or record your findings below. If you find that you are regularly getting drastically different results from your calibration that means your thermometer is no longer reliable and it is time to replace it.

Elevation (Feet)	Boiling Point of Water	Gelling Point of Jam
Sea Level	212°F	220°F
500	211°F	219°F
1,000	210°F	218°F
1,500	209°F	217°F
2,000	208°F	216°F
2,500	207°F	215°F
3,000	206°F	214°F
3,500	205°F	213°F
4,000	204°F	212°F
4,500	203°F	212°F
5,000	202°F	211°F
5,500	201°F	210°F
6,000	200°F	209°F
6,500	199°F	208°F
7,000	198°F	207°F
7,500	197°F	206°F

Record Your Findings Below

Your elevation: _____
Boiling water temperature _____
Degrees variance* _____
Date: _____

**Difference between the boiling point of water shown above for your elevation and the actual reading on your candy thermometer.*

Adjust recipes as follows:

- If your thermometer reads higher than the temperature shown in the above table, **add** the difference to the stated temperature in your recipe.
- If your thermometer reads lower than the temperature shown in the above table, s**ubtract** the difference from the stated temperature in your recipe.

REFERENCES

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International Dairy Foods Association, http://idfa/org/news-views/media-kits/milk/pasteurization

LOCAL CONTACT

For more information, contact the University of California Cooperative Extension office in your county. See your telephone directory for addresses and phone numbers, or visit http://mfp.ucanr.edu/Contact/Find_a_Program/.

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