



# DAIRY CATTLE

MIDDLE/HIGH SCHOOL



When a product, like milk, leaves the farm, it is processed before it is ready to be sold. After milk leaves the dairy farm, it is pasteurized, homogenized, fortified, and standardized. The process of pasteurization was discovered in 1856 by French scientist Louis Pasteur. This process heats liquids to high temperatures which kills bacteria and protects the purity and flavors of milk. Homogenization breaks up the cream, or fat molecules, in milk so they are the same density and size as the rest of the milk. This results in a uniform texture and keeps the cream from separating and rising to the top of the milk.

Milk in the United States is often fortified with vitamin A and D, which are found naturally in milk. Milk with reduced fat levels (2%, 1% or skim) does not contain enough vitamin A without fortification. Vitamin D is important for calcium absorption. Vitamin D and calcium are needed in our diets for healthy bones and teeth.



Standardization is the process of removing fat from milk and adding it back to get the desired fat content. The percentage of fat found in milk depends on the animal which produced it. Other factors, such as the animal's nutrition and the stage of lactation, also affect fat content. Most cattle produce milk with 3-5% milk fat. Consumers desire milk with a consistent texture and flavor. Consumers also desire lower fat milk products. Through standardization, whole milk, 2%, 1%, and skim milk are made.



Once milk is pasteurized and homogenized, it can be used to make many different food dairy products such as butter, ice cream, cheese, and cottage cheese. Each process requires milk to undergo a physical or a chemical change. To make butter, the cream found in milk goes through a physical change. The fat globules in the cream separate from the buttermilk when the cream is churned, or shaken. Another example of a physical change is the process used to make ice cream. Ice cream is made by mixing milk, cream, and sugar together and then freezing it into ice cream. When making cheese, rennet, which is an enzyme, is added to milk. Rennet causes a chemical reaction where the milk solids curdle and separate from the whey, which is the liquid portion of milk. Cottage cheese also requires a chemical change. To make it, an enzyme is added to milk causing it to curdle. However, the cheese curds stay loose and are mixed with the whey to make the cottage cheese.

# MILK SCIENCE EXPERIMENT

## DIRECTIONS:

1. Warm one cup of milk in the microwave for 90 seconds.
2. Mix the warm milk with 4 tablespoons of vinegar.
3. Stir for a few minutes, then strain and squeeze out the excess liquid.

You'll end up with a moldable "plastic" which can be formed into fun shapes. In a few days, the shapes will harden.

# LEARN MORE



Scan to see the Robotic Milker at Oklahoma State University.



Scan to see the process of making cheese.

## FUN FACTS!

Only 30% of teenage boys (ages 9-18) and 12% of teenage girls consume 3 servings of dairy products daily, which are recommended in a healthy diet.

Cows can smell food up to 6 miles away!

## COTTAGE CHEESE AND FRUIT BLENDER ICE CREAM



### INGREDIENTS:

- 1 1/2 cups frozen fruit such as berries or mango chunks
- 1/2 cup frozen banana (about 1 small banana), diced
- 1 cup cottage cheese
- 1 tablespoon honey
- 2-3 leaves fresh basil or mint (optional)

### INSTRUCTIONS:

1. Combine frozen fruit in a food processor or high-speed blender and process until the mixture resembles a thick puree.
2. Add the cottage cheese, honey and herbs (if using) and continue to puree until the mixture is thick and smooth.
3. For soft serve style ice cream, serve immediately with an additional sprig of fresh herbs, if desired. Alternately, the ice cream can be frozen into a loaf pan for hard-scoop ice cream or frozen into molds for popsicles.

\* Tip: For perfectly scoopable ice cream, allow loaf pan to thaw in the refrigerator for 2 hours before serving.