



Lessons presented by  
**Oklahoma State University**  
*Ferguson Family Dairy Visitor Center*  
 With Southwest-Southland Dairy Farmers

<b>Instructor</b>	Jaycie Heath
<b>Grade Level</b>	Adult
<b>Lesson Title</b>	Dairy Processing (Unscheduled In Person)

### TEACHER PREPARATION

Learning Goals & Standards/Performance Indicators	
Learning Goals	Standards
1. Upon completion of this lesson participants will be able to understand and describe milk processing steps.	N/A
Resources and Materials	
<input type="checkbox"/> <a href="#">The Story of Milk: From the Cow to the Cup</a> <ul style="list-style-type: none"> <li>○ <a href="#">The Story of Milk</a></li> </ul> <input type="checkbox"/> <a href="#">Milk Made for You</a> <input type="checkbox"/> <a href="#">Moving Milk Through the Dairy Plant</a> <input type="checkbox"/> Southwest Southland Dairy Farmers- Milk at the Dairy <input type="checkbox"/> Visuals in the center <input type="checkbox"/> Student tour guides	
Announcement and Other Preliminaries	
1. Welcome visitors to the Ferguson Family Dairy, introduce self and what you do for the dairy, etc.	

### LESSON DELIVERY

#### Anticipatory Set

- As you may know, processing of food products is vital to increase shelf life, increase food safety, and ensure food safety and quality for consumption.
- Today we hope to guide you through the processing steps that dairy products go through before they reach your table.

#### Direct Instruction

<b>1<sup>st</sup> Learning Goal:</b> Upon completion of this lesson participants will be able to understand and describe milk processing steps.	
Content Outline	Instructional Strategies
<u>At the Dairy</u> <ul style="list-style-type: none"> <li>• Dairy cows, like our Holsteins, can produce up to ten gallons of milk a day.</li> </ul>	<ul style="list-style-type: none"> <li>• Including images or prerecorded videos of milking, tanker trucks, processing plants, separators, homogenizers/un-homogenized milk, pasteurizers, etc. will be vital</li> </ul>

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- Most dairies milk their cows 2-3 times a day, to empty their udders and keep the cows comfortable.
- The milk at the farm is called *raw milk* because it hasn't been processed for human consumption yet.
- As the cows are milked, the milk is immediately cooled through tubing and bulk tanks.
  - Bulk milk tanks will cool milk from about 101\* F to 34-36\* F in a short period of time and will maintain that temperature until the milk leaves the farm.
  - An agitator in the bulk tank mixes the milk periodically to maintain even temperature throughout.
  - The milk is never exposed to outside air or airborne contaminants.

#### Leaving the Dairy

- Every day or two, raw milk is taken from the bulk tanks at the dairy in an insulated tanker truck to a dairy processing plant. Within the tanker the milk is kept at 38 degrees.
  - The tanker holds approximately 6000 gallons of milk and is always cleaned and sanitized before milk is loaded.
- The hauler checks the milk to make sure it meets certain standards of freshness and collects several samples from each farm milk tank.
- Once the milk arrives at the processing plant it is tested again before being unloaded.

#### Processing the Milk

- Milk is transported to one of several processing plants that manufacture products like cheese, ice cream, milk, yogurt, butter, or milk powder.

to understanding.

- Including prerecorded video of our parlor and milk storage tanks could increase understanding.
- Show visitors to the viewing window of the robotic milker's storage tank.

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- The milk samples are tested at a laboratory by lab technicians to make sure the milk is safe and fresh to be processed for us to drink.
  - One sample is immediately checked for temperature. If the temperature of the milk is above 40°F, the entire load is discarded.
  - Another sample is tested for bacteria and antibiotics. In the rare event that the tanker of milk tests positive, the entire load is discarded.
  - Milk is never unloaded until it passes all tests.
  - The technician also tests the butterfat content. Butterfat is also called cream.
- When milk passes “inspection,” processing begins.
- Once the tank truck driver gets the okay from the lab, the pumping begins.
  - Milk is pumped into large, refrigerated storage tanks or silos.
- One of the first stops is the separator.

#### The Separator

- Milk is pumped into a separator that spins the milk to separate cream, which is lighter, from the skim.
- The desired amount of cream can then be added back to the skim later to obtain milk standard for 1%, 2%, or whole milk which is 3.25% fat. Excess cream can then be used to make ice cream and butter.
- Some of the milk is even pumped to mixing tanks. Here other ingredients are added to make flavored milk.

#### The Homogenizer

- The milk is pumped into a homogenizer that breaks up the fat globules and makes them smaller.

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- Milk is forced through very small holes under great pressure.
- This breaks the butterfat particles into tiny, uniform pieces.
- A protein coat surrounds each butterfat piece. This keeps the butterfat from clumping back together.
- This makes the milk have consistent flavor when bottled.
- If milk were not homogenized, the cream would rise to the top. You would have to shake or stir the milk before drinking it.

#### Pasteurization

- In 1865, a French scientist named Louis Pasteur discovered that heating liquids to high temperatures kills microorganisms.
- Milk is pasteurized which kills bacteria that may be harmful to health.
  - Heating milk to 165\* F for 15 seconds then quickly cooling it down to 35\* F accomplishes this.
- Pasteurization protects the purity and flavor of milk without influencing the nutrient value.

#### Preparing Milk for You

- Milk is always bottled in sterile containers that are fed down a conveyor belt to the filling station.
- Containers (bottles or cartons, in some countries they even use plastic bags) are automatically filled with the proper amount of milk, sealed and capped.
- Milk is stored in a refrigerated room that is kept at 36 degrees until it is ready to be transported to grocery stores or schools.
- Refrigerated trucks are used to deliver bottled milk to its retail destination.

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- It takes only about two days from the time milk leaves the cow until it reaches the grocery store.
- *Still, some milk doesn't get bottled for drinking, instead it's set aside for further processing to make ice cream, cheese, yogurt, butter, or other dairy products.*

Milk is Safe

- Milk is one of the safest food/drinks you can consume:
  - Human hands never touch the milk.
  - The milk is tested to make sure it is fresh and clean.
  - Milk is always kept cold as it travels from the cow to dairy processing plant and finally to the store or school.
  - These steps are important to make sure that milk is always safe and fresh for us to drink.

**Learning Activity**

- Adults should be provided with the option to take an informational handout that covers basics about the dairy, how to schedule tours, and animal science department contact information.

**Closure**

**Closing Announcements/Reminders**

- Answer any questions they may have
- Thank them for coming to the Ferguson Family Dairy