



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

Instructor	Jaycie Heath
Grade Level	6-8
Lesson Title	Dairy Byproducts (Scheduled In Person)

TEACHER PREPARATION

Learning Goals & Standards/Performance Indicators	
Learning Goals	Standards
1. Upon completion of this lesson students will be able to understand that dairy products extend beyond milk, cheese, ice cream, etc. and be able to identify a few key byproducts.	1. <u>7. PS1.3</u> Gather and make sense of information to describe that synthetic materials come from natural resources and impact society. 2. <u>SS: 6.4</u> The student will analyze the interactions of humans and their environment in the Western Hemisphere. <ul style="list-style-type: none"> • 6.4.1 Describe the commercial agriculture and industrial regions that support human development. • 6.4.2 Evaluate the effects of human modification on the natural environment through transformation caused by subsistence and commercial agriculture, industry, demand for energy, and urbanization. 3. <u>OKH.6.2</u> Analyze the impact of economic growth in various sectors including: <ul style="list-style-type: none"> <input type="checkbox"/> C. continuing role of agriculture
Resources and Materials	
<input type="checkbox"/> Iowa State Byproducts Bingo <input type="checkbox"/> By-products of dairy industry <input type="checkbox"/> Products with Hidden Dairy <input type="checkbox"/> Casein in Health <input type="checkbox"/> Surprising Foods that Contain Milk <input type="checkbox"/> Southwest Southland Dairy Farmers- The Dairy Industry: Protecting Our Environment and Future <input type="checkbox"/> Visuals in the center <input type="checkbox"/> Student tour guides	
Announcement and Other Preliminaries	
1. Welcome students to the Ferguson Family Dairy, introduce self and what you do for the dairy, etc.	

LESSON DELIVERY

Anticipatory Set

- Has anyone had any dairy products today? (Milk in their cereal, ice cream, yogurt, etc.)
- What is the weirdest dairy product that you know of?
 - Take a few answers, make sure they understand that dairy products are produced from milk and dairy cows.
- Did you know that there are a lot of things that use byproducts of dairy in them? Today we are going to learn about the surprising products that have dairy in them.

Direct Instruction

<p>1st Learning Goal: Upon completion of this lesson students will be able to understand that dairy products extend beyond milk, cheese, ice cream, etc. and be able to identify a few key byproducts.</p>	
Content Outline	Instructional Strategies
<p><u>What is a Byproduct?</u></p> <ul style="list-style-type: none"> • A byproduct is a secondary, or unintentional, product made during the processing or production of another product. <p><u>What are the Main Dairy Byproducts?</u></p> <ul style="list-style-type: none"> • When we are processing milk, we end up with a few main byproducts: <ul style="list-style-type: none"> ◦ Lactose- The sugar found in milk. Lactose is a large sugar molecule that is made up of two smaller sugar molecules, glucose and galactose. ◦ Casein- a protein found in milk that contains amino acids. ◦ Whey- a dilute, highly perishable greenish yellow fluid and the largest by-product of the dairy world <p><u>Lactose</u></p> <ul style="list-style-type: none"> • Pharmaceutical-grade lactose is highly pure lactose specifically produced to meet the standards of medical regulations. Lactose is widely used as a filler or diluent in tablets and capsules. 	<ul style="list-style-type: none"> • Provide students with images of byproducts or even the real thing to allow them to better understand how varied the use of dairy byproducts is.

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- Lactose can also be used to help increase shelf life of medications.
- Infant formulas or medical supplements for those who have special nutritional and protein requirements.
- Lactose may also be used in the production of toothpaste and even the hardening of steel.
- Lactose is used to create specialty adhesives and paper coatings.

Casein

- Casein has a variety of uses including:
- Cheese making
- paper, textile, paint, leather, rubber production
- Special “high-clarity” casein has been used to manufacture television screens.
- Canned tuna– Several brands of canned tuna have hydrolyzed caseinate, a peptide version of casein, in them to enhance flavor.
- Baby formula- its proteins and amino acids make it a nutritional addition.
- Protein supplements are often casein based or have casein as a primary ingredient.
- Some chewing gums even use Recaldent, a protein from casein, in their production process (trident is one example)

Whey

- Whey was formerly a waste product during the manufacture of cheese but is now used for:
- Cheese whey accounts for nearly 95% of total whey
- Candy, baby food, baked goods, lactic acid (an ingredient in cake mixes), and cosmetics (makeup).
- Dried whey and whey products are often utilized in animal feeds.

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- Whey protein based infant formulas and other nutritional products that require lactose
- Medications and vitamins sometimes contain whey.
- Cheese whey proteins are used to make clear film packaging materials.
- Whey and lactose are even used to make specialty adhesives and paper coatings.

Learning Activity

- Students should be provided with images (some byproducts of dairy production, others that aren't), at the conclusion of the presentation they should sort images into groups of which images aren't byproducts and those that are byproducts of lactose, casein, or whey.

Assessment

- Questions similar to the following should be asked:
 - What is lactose?
 - What is whey?
 - What is casein?
 - What is one product you learned about that you didn't know was a dairy byproduct before today?

Closure

Closing Announcements/Reminders

- Answer any questions they may have
- Show them the robot and viewing windows one more time
- Thank students for coming to the Ferguson Family Dairy