

# Cud to Curd

**Grade Level: 4-8**

## Lesson Overview

Doesn't a gooey bowl of macaroni and cheese sound good? What kind of cheese do you like best in this dish? Or, do you like a blend of several different types? Students will follow the process from cow to cheese and learn fascinating facts about the steps it takes to make some of our favorite cheeses.

## Student Objectives

1. Outline the process of cheesemaking from farm to consumer.
2. Explain cheese making terms.
3. Explore the many different types of cheese that are made from cow's milk.

## Materials

- ✓ Choose Your Cheese, Please! Activity Sheet
- ✓ Copy of *Extra Cheese, Please!* By Cris Peterson; ISBN 978-1590782460 or any other resource that explains the cheesemaking process. This book may be available from your local agriculture literacy coordinator.  
[http://www.agintheclassroom.org/AGLitCoord/contact\\_your\\_county\\_agricultural.shtm](http://www.agintheclassroom.org/AGLitCoord/contact_your_county_agricultural.shtm)
- ✓ *Extra Cheese, Please!* sequence strips
- ✓ Check Out These Cheese Facts information sheet

## Vocabulary

- **bacteria** – tiny organisms that cause milk to sour.
- **brine** – very salty water.
- **butterfat** – the fat contained in milk.
- **cud** - partly digested food returned from the first stomach of ruminants to the mouth for further chewing
- **condense** – to remove part of the water in a substance.
- **curds** – the thickened or solid parts that form in soured milk and are the beginning of cheese.
- **hay** – crops such as clover, alfalfa and grass that are cut, dried, baled and then fed to cows.
- **mozzarella** – mild, white, semi-soft Italian cheese.
- **pasteurization** - process by which a controlled heat is used to eliminate all bacteria.

- **protein** – a basic nutritional requirement for all living things.
- **rennet** – a liquid containing enzymes from a calf’s stomach that is used to curdle milk.
- **silo** – a tall structure used to store hay, silage or grain on a farm or milk at a dairy plant.
- **soybean meal** – high-protein feed made by grinding of soybeans.
- **starter culture** – a liquid containing acid-forming bacteria that sours milk.
- **whey** – the watery part of milk that separates after the milk has soured and thickened; water by-product of the cheese making process.

## Background Information

### How Is Cheese Made?

Cheese is made by separating the milk liquid (or whey) from the milk solids (or curd). This is done by gently heating the milk and adding a culture like bacteria or an enzyme like rennet that causes the milk to curdle. After the curd is firm, it is cut into small pieces allowing more whey to be released. The smaller the cut pieces, the dryer the curd will become, and the harder the final cheese will be. At this point, the curd may be heated again or stacked to drain off more whey, and salt may be added before the curd is placed into molds where it is pressed for a time to create an even texture. The cheese is left to age for a few weeks to 15 months or longer. Variations in this process are what produce all the different kinds of cheese.

Soft cheeses are usually younger cheeses that have more moisture content, while hard cheeses have been aged for several months or years, losing more moisture in the process. For soft cheeses, the curd may be lightly pressed or not pressed at all during the cheesemaking process, while lengthier pressing results in harder cheeses.

Cheeses with a strong, pungent odor – stinky cheeses – are made by smearing bacteria called *Brevibacterium linens* or *B. linens* on the exterior of the cheese, and repeatedly washing it in a saltwater brine to encourage the bacteria to grow. The bacteria help the cheese ripen and produces the strong aroma.

Retrieved from Wisconsin Cheese: <https://www.wisconsincheese.com>

Check Out These Cheese Facts information sheet for more.

### Procedure

1. “Choose Your Cheese, Please!” Interest Approach: Not all cheeses can be made in a day! Students will match some well-known types of cheese with a fact on its origin or how it is made.
2. Provide each student with a sequence strip that tells the story of how cheese is made from the book, Extra Cheese, Please! by Cris Peterson.

3. Instruct students to form a line at the front of the classroom to tell the story of how cheese is made.
4. Check for proper timeline placement by reading the book, *Extra Cheese, Please!* by Cris Peterson to the students. They may adjust their placement in the timeline as the facts are read. (This book may be available from your local agriculture literacy coordinator.  
[http://www.agintheclassroom.org/AGLitCoord/contact\\_your\\_county\\_agricultural.shtm](http://www.agintheclassroom.org/AGLitCoord/contact_your_county_agricultural.shtm))

OR

5. Following the reading, the students will develop a timeline which explains cheese making, from its beginning on the farm to the finished product in the store. This can be done individually or in teams. Some of the cheese making terms (found in the vocabulary) should be included in the timeline. Students will explain the terms when sharing the timeline.
6. After the class has developed the timeline, place each individual timeline fact on a strip of paper or large index card. Mix them up and provide each student with one timeline fact. Instruct students to place themselves in the correct timeline order.

## Extension Activities

1. Use the Beautiful Bovine found on Illinois Agriculture in the Classroom activity as an interest approach to introduce dairy cows. In this activity, students will be able demonstrate some of the body parts of a cow to show how a cow is different from a human.  
<http://www.agintheclassroom.org/TeacherResources/InterestApproaches/Beautiful%20Bovine.pdf>
2. The teacher may use the recipe for home-made pizza, found in the book, *Extra Cheese, Please!* The finished pizza could be eaten while viewing “The Art of Cheesemaking” or any other video.
3. Students may enjoy making their own cheese. A lesson to complement this activity is Making Cottage Cheese.
4. There are well over 100 different types of cheeses made in the United States alone. Students can research their favorite cheeses to learn how long it takes for them to get to the store or some interesting facts about how they are made. They may also find easy recipes to try making their selected cheese. Students may share their research with the class.
5. The “What Kind of Milk Do You Drink” lesson would connect well with this lesson.

## Additional Resources

- The Art of Cheesemaking: <https://www.youtube.com/watch?v=dQ6LZ6MgSek>

- Dairy Ag Mag:  
[http://agintheclassroom.org/TeacherResources/AqMags/2018%20Dairy%20Ag%20Mag%20Online%20Version\\_P.pdf](http://agintheclassroom.org/TeacherResources/AqMags/2018%20Dairy%20Ag%20Mag%20Online%20Version_P.pdf)
- Ag-Venture with Dairy:  
<https://beyondthebarndoor.files.wordpress.com/2021/06/agventure-with-dairy.pdf>
- Dairy Ag Readers/Terra Nova:  
[http://agintheclassroom.org/TeacherResources/TerraNova/bw\\_dairynews.pdf](http://agintheclassroom.org/TeacherResources/TerraNova/bw_dairynews.pdf)
- Cheese: <https://www.stldairyCouncil.org/uploads/FamilyResources/Cheese.pdf>
- Nutrition of Cheese:  
[https://www.stldairyCouncil.org/uploads/pdfs/STLDDC\\_Cheese\\_Sell\\_Sheet\\_v2\[1\].pdf](https://www.stldairyCouncil.org/uploads/pdfs/STLDDC_Cheese_Sell_Sheet_v2[1].pdf)
- Wisconsin Cheese: <https://www.wisconsincheese.com>
- *Say Cheese! A Kid's Guide to Cheese Making* by Ricki Carroll and Sarah Carroll; ISBN 978-1612128238

## Standards

### **Illinois English Language Arts Standard**

W.5.2 Write informative/explanatory texts to examine a topic and convey ideas and information clearly.

The **M**ultidisciplinary **A**gricultural **I**ntegrated **C**urriculum (mAGic) was created in 2004 under the leadership of the Illinois State Board of Education (ISBE) and the Facilitating Coordination in Agricultural Education Project (FCAE). Funding was made available through the FCAE grant budget from the agricultural education line item of the ISBE budget. This revision, as printed, was developed in September 2021.



These mAGic lessons are designed to bring agriculture to life in your classroom. They address the Illinois Learning Standards in math, science, English language arts and social studies.

Dairy mAGic project update writers/reviewers: Rhodora Collins – Dekalb County; Suzi Myers – Kane County; Connie Niemann – Montgomery County; Debbie Ruff – Livingston County; Jennifer Waters – Sangamon County; and Dawn Weinberg – Hancock County.

## Check Out These Cheese Facts

- Cheesemaking has been around for nearly 4,000 years, according to the International Dairy Foods Association. No one really knows who made the very first cheese. Historical records indicate that travelers from Asia brought their technique of cheesemaking to Europe before the Roman Empire.
- During the Roman Empire, large Roman houses had separate kitchens for manufacturing cheese only. They were called “*careale*.”
- The world produces more cheese than coffee, tobacco, tea, and cocoa beans combined.
- Today, there are over 2,000 varieties of cheeses. As a country, the U.S. produces the most cheese in the world annually.
- Mozzarella is the most popular cheese in America. This is due to our love of this fresh cheese as a pizza cheese. Cheddar is the second most popular.
- The holes or eyes in cheese such as swiss, is the result of carbon dioxide made by bacteria in the cheese, forming little air pockets as the cheese hardens.
- Cheese is kept for a period of time before it is ready to eat. Some varieties, such as blue cheese, gorgonzola and brie are exposed to mold which helps them age properly.
- Cheese curds squeak because the elastic protein strands in the cheese rub against the enamel of your teeth.
- It takes approximately ten pounds of milk to make one pound of cheese.
- Some varieties of cheese like mozzarella, cheddar, and swiss help prevent tooth decay by promoting saliva, which helps to eliminate sugar and acids from the mouth.
- Most cheese is made with just three ingredients: milk, salt, and a coagulant such as vinegar, rennet, or bacteria.
- People who are lactose intolerant can still enjoy cheese. Hard cheeses like parmesan and asiago are very low in lactose.
- In the United States, the month of June is National Dairy Month and the last week of June is National Cheese Week.
- National Cheese Curds Day is celebrated each October 15<sup>th</sup>. Culver’s created this observance with the first National Cheese curd Day being celebrated in 2015.
- Cheese can be produced using a variety of milk including cow, buffalo, goat, horse, and even camel.

**“Extra Cheese, Please!” Timeline** *(In order of occurrence)*

Cut out strips and randomly pass out to students.

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Annabelle cleans her newborn calf. Now that she has given birth, she can begin to produce milk.

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To help Annabelle make milk, she is fed a high protein blend of hay, corn and soybean meal.

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Annabelle is milked each morning and night. The milk goes through a stainless steel pipe into a cooling tank.

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The milk is tested for bacteria, butterfat, and protein.

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Every two days, the milkman pumps the milk into his truck and hauls it to the cheese factory.

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Milk flows through the pasteurizer that heats it to 165 degrees, which kills any harmful bacteria.

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After the milk cools, it is pumped into a stainless steel vat. Starter culture is added to the milk.

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The cheesemaker adds rennet to the vat. Rennet thickens the milk. Curds begin to form.

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After the curd forms, special knives in the vat cut the curd into thousands of small cubes.

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The curds and whey are pumped onto a finishing table. The cheesemakers rake the curds as the whey drains off the table.

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Workers cut the cheese into large slabs that are fed into a machine called a cheese mill.

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The bricks of cheese float in a salt brine bath. This is where the cheese develops its own distinctive flavor.

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The blocks of cheese are cut and packaged for shipping.

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The cheese is shipped to grocery stores and pizza parlors across America.

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We get our cheese for pizza at the grocery store!

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Every Friday night, we make a big delicious cheese pizza.

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When you eat your pizza, remember Annabelle and her remarkable milk!

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## **“Extra Cheese, Please!” Timeline ANSWER KEY**

*(In order of occurrence)*

Annabelle cleans her newborn calf. Now that she has given birth, she can begin to produce milk.

To help Annabelle make milk, she is fed a high protein blend of hay, corn and soybean meal.

Annabelle is milked each morning and night. The milk goes through a stainless steel pipe into a cooling tank.

The milk is tested for bacteria, butterfat, and protein.

Every two days, the milkman pumps the milk into his truck and hauls it to the cheese factory.

Milk flows through the pasteurizer that heats it to 165 degrees, which kills any harmful bacteria.

After the milk cools, it is pumped into a stainless steel vat. Starter culture is added to the milk.

The cheesemaker adds rennet to the vat. Rennet thickens the milk. Curds begin to form.

After the curd forms, special knives in the vat cut the curd into thousands of small cubes.

The curds and whey are pumped onto a finishing table. The cheesemakers rake the curds as the whey drains off the table.

Workers cut the cheese into large slabs that are fed into a machine called a cheese mill.

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Name \_\_\_\_\_

## Choose Your Cheese, Please!

There are at least 35 different cheeses made in the United States using cows' milk. Below are 10 of these cheeses. Match each cheese with a fact about its origin.

- |                   |   |
|-------------------|---|
| ___ Brick         | A. Originated in Parma, Italy.  |
| ___ Cheddar       | B. Originally, this cheese was made by leaving it in a cave for over a year.  |
| ___ Colby         | C. The holes in this cheese are formed when air pockets pop as the cheese ripens.                                   |
| ___ Gorgonzola    | D. The name of this cheese is an Italian expression for "beheaded"- referring to its being strung up in a rope bag. |
| ___ Monterey Jack | E. Originally produced by monks in medieval monasteries.  |
| ___ Muenster      | F. First made by Joseph Steinwand in Colby, Wisconsin in 1874.  |
| ___ Parmesan      | G. Most often found as a pear-shape. The loaves ripen while suspended by being wrapped in ropes and hung to cure.   |
| ___ Provolone     | H. Cheese created by David Jacks in Monterey, California in the 1890's.   |
| ___ Scamorza      | I. Named for both its shape and the way it was originally made.   |
| ___ Swiss         | J. This American-made cheese is similar to the cheese made in Cheddar Gorge, a small village in England.            |

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