

# THE Mission

## Mission Accomplished – a review of the story

Let's make sure we accomplished our mission of discovering how milk is made into Wisconsin cheese. Let's see if we can all do the curd science dance.

**Step 1: Milk** - action like milking a cow

**Step 2: Standardize** – swish arms together like a paddle mixing the milk together

**Step 3: Coagulate** – do a jumping jack motion, start wide and bring hands and feet together

**Step 4: Cut** – pretend to slice through the curds using your arms

**Step 5: Stir, Heat and Drain** – stir the curds using both arms to make a stirring motion

**Step 6: Transform** – pretend to flip the piles of curds

**Step 7: Press** – use both hands to push down the curds

**Step 8: Cure** - Pretend to check your watch/clock

## Curd Taste Test Activity (optional)

Time for some Wisconsin Cheese!

We are going to now taste test some fresh, Wisconsin cheese curds.

Give each student a napkin and 5 oz. cup with 3-4 cheese curds. Remind the students that we are all going to “take a polite bite” and try the curds together.

Ask the students to observe their curd using their senses...

- Is the curd hard or soft?
- Is it solid or liquid?
- What shape is your curd?
- What does your curd smell like?

Have the students taste their curd. Ask for examples of what the curd sounds like when they bite into it.

As the students enjoy their curds, ask them to recall the steps of the cheesemaking process that had to happen to be able to make a cheese curd.



[WisconsinDairy.org](http://WisconsinDairy.org)



**DID YOU KNOW?**  
**There are more than 600 different varieties, types and styles of cheese made in Wisconsin.**



## Teacher's Guide

# curd SCIENCE

**The Incredible Journey from Milk to Curd**

as told by  
Violet Anderson,  
Kid Scientist  
Extraordinaire



**Brought to you by the Dairy Farm Families of Wisconsin**



# THE Mission

## **CURD SCIENCE – THE INCREDIBLE JOURNEY FROM MILK TO CURD**

By Violet Anderson

### **Lesson Overview**

**CURD SCIENCE – THE INCREDIBLE JOURNEY FROM MILK TO CURD** takes children on a journey through the “eyes” of second grader and scientist, Violet Anderson, as she discovers how milk is made into Wisconsin cheese. Students will visually experience the process of turning a liquid, milk, into a solid, Wisconsin cheese. The steps of cheesemaking are brought “under the microscope” for students to learn and understand the important role of science in making cheese and the importance of dairy in building healthy bodies.

### **Lesson Objectives**

Students will be able to:

- Describe how milk from Wisconsin Dairy Farms is made into Wisconsin Cheese.
- Describe milk as a liquid and cheese as a solid.
- Understand how cheese can be eaten as one of three daily servings of dairy.

### **Materials and Advance Preparation**

- Online Book: **CURD SCIENCE – THE INCREDIBLE JOURNEY FROM MILK TO CURD** by Violet Anderson
- Review Teacher Guide prior to presenting lesson
- Gallon of milk (prop)
- Food and materials for Curd Tasting
- Lab Coat (optional)
- Suggest teachers show our “We are America’s Dairyland” videos- “Cows Make Milk” and “Care of Cows” prior to reading the book. Videos are located on our website at <https://www.wisconsinmilk.com/Youth-and-Schools/Dairy-Education>

### **Curd Tasting (optional but recommended)**

- For 25 students:
- 2 pounds of fresh Wisconsin cheese curds
- Food service gloves
- 25 5 oz plastic cups
- 25 Napkins

### **Tips for presenting CURD SCIENCE – THE INCREDIBLE JOURNEY FROM MILK TO CURD book**

- Read pages 1 & 2 as written.
- Beginning on page 3, the storyline is the text that appears on green. Read the text on the green part of the page first.
- “Did You Know?” highlights “fun facts” of each step in making cheese.
- “Curd’s the Word!” is a special section that gives the definition to highlighted words within the story. Read and discuss “Curd’s the Word!” with students to ensure their understanding.
- “Science Behind the Science” shares more science and technology involved in each step of cheesemaking.
- “Cheesemaking Dance” is a special series of 8 dance moves to be taught after you read each step of cheesemaking in the book.

### **Lesson Presentation**

#### **CURD SCIENCE – THE INCREDIBLE JOURNEY FROM MILK TO CURD**

Show the students a gallon of milk. Ask them to answer the following:

- What is in this container? (Milk)
- What animal does most milk come from? (Dairy Cow)
- Is milk a solid or a liquid (Liquid)
- What other kinds of foods, called dairy foods, can we make from milk? (Milk, chocolate milk, cheese, yogurt, butter, sour cream, etc.)
- Are most dairy foods solid or liquid? (Solid)
- How many servings of dairy do we need every day? (3)
- Why are dairy foods (milk, yogurt and cheese) healthy for our bodies? (Calcium - strong bones, strong teeth; Protein - strong muscles)
- How could we make all of the liquid milk in this gallon of milk fit into the palm of our hands? (Make it into cheese)



## **Did You Know?**

**In five minutes, one cow can give about four gallons of milk. That’s enough to supply 64 students with a carton for lunch!**



Show the online book cover, **CURD SCIENCE – THE INCREDIBLE JOURNEY FROM**

**MILK TO CURD** by Violet Anderson and share with the students that you are going to read the book about a second grader named Violet who goes on a mission to discover how milk is made into cheese. Explain that Violet is a “kid- scientist” and that today we will need to be scientists to discover exactly how we can make all of the milk in this gallon turn into cheese. (Put on lab coat while explaining – optional)

- Today, a fellow scientist, Violet, is going to help us learn how to make Wisconsin cheese. Violet is just like you...she is a Wisconsin 2nd grader who wants to learn how all of the milk from Wisconsin dairy cows is made into real Wisconsin Cheese.
- We have been given a special mission – discover how milk is made into cheese. We are going to “jump” into the story with Violet. As we learn about each step of cheesemaking, we are going to learn a dance move to help us remember how we make real Wisconsin cheese.
- If you accept this challenge we need to say “More cheese, please” on the count of three ...1...2...3...“More cheese, please!”

**Read the book following the Tips above.**

#### **Milk – Step 1**

**Curd’s the Word:** Capacity means the amount something can hold; volume

Share an example of “capacity” - show the gallon of milk and share with the students that the capacity of the jug is one gallon of milk.

**Cheesemaking Dance Step 1:** Milk – move hands up and down like you are milking a cow

#### **Standardize – Step 2**

**Curd’s the Word:** Standardize is to make something all the same.

Give a personal example, such as making instant pudding using milk and pudding mix...we mix it until the pudding looks the same, not chunky or too liquid.

**Cheesemaking Dance Step 2:** Standardize – swish arms together like a paddle mixing the milk together

#### **Coagulate – Step 3**

**Curd’s the Word:** Coagulate means to change a liquid into a solid.

Give an example such as when a scrape on your skin bleeds, but you get a scab.

**Cheesemaking Dance Step 3:** Coagulate – do a jumping jack motion, start wide and bring hands and feet together

#### **Cut – Step 4**

**Curd’s the Word:** Whey is the watery part of milk that separates from the solid curds during the cheesemaking process.

Give an example such as the liquid in cottage cheese is whey.

**Cheesemaking Dance Step 4:** Cut – pretend to slice through the curds using your arms

#### **Stir, Heat & Drain – Step 5**

**Cheesemaking Dance Step 5:** Stir, Heat and Drain – stir the curds using both arms to make a stirring motion

#### **Transform – Step 6**

**Curd’s the Word:** Cheddaring is the flipping and turning of the heaps of curds to squeeze out remaining whey.

**Cheesemaking Dance Step 6:** Transform – pretend to flip the piles of curds

#### **Press – Step 7**

**Cheesemaking Dance Step 7:** Press - use both hands to push down the curds

#### **Cure – Step 8**

**Curd’s the Word:** Cure is the method by which cheese is aged or treated to give it a certain flavor.

**Cheesemaking Dance Step 8:** Cure- pretend to check your watch/clock

# curd SCIENCE

**The Incredible Journey  
from Milk to Curd**

*as told by  
Violet Anderson,  
Kid Scientist  
Extraordinaire*



**Brought to you by the Dairy Farm Families of Wisconsin**

# curd SCIENCE

**The Incredible Journey  
from Milk to Curd**

*as told by  
Violet Anderson,  
Kid Scientist  
Extraordinaire*



**Brought to you by the Dairy Farm Families of Wisconsin**



# That's me, Violet.

I've always been curious. Which I guess is good, seeing as I'm a kid scientist and all.

**The state of Wisconsin is known all over the world for dairy. This reputation grows ever larger as Wisconsin's dairy farmers continue to produce pure, delicious milk, allowing our cheesemakers to craft some of the finest cheeses in the world.**

**This book is dedicated to those dairy farmers and cheesemakers who work hard every day to make this possible.**



# THE Mission

One day at school, Mrs. Hannigan told us we'd be learning about how cheese is made. Me being naturally curious, (not to mention, a big fan of cheese!)...well, I just couldn't wait to dive in.





# SAY Mooooo

Everyone knows that all great cheese stories begin on Wisconsin dairy farms. That's because Wisconsin cheese is made from one of the best things on earth: Wisconsin milk.

Dairy cows get milked by machines at least two times a day. (And from what I hear, they like it!). The milk goes straight from the cow, through a pipe and into a cooler where it's kept until it can be delivered to the cheese factory. Amazing, isn't it?

**Did You Know?**  
In five minutes, one cow can give about four gallons of milk. That's enough to supply 64 students with a carton for lunch!





# STEP 1 Milk

Every day, a tanker truck like this one pulls up to the milking center. After the driver tests a sample for quality, the milk is pumped into the tank and hauled to the cheese factory.

Once the truck arrives at the factory, the milk is pumped into large silos, where computers check it for weight, temperature and **capacity**.

**Did You Know?**  
It takes 10 pounds (!) of milk to make one pound of cheese.



**Curd's the Word!**  
**CAPACITY** • [n. kuh-pas-i-tee]  
The amount something can hold; volume.

**The Science Behind the Science**  
**COMPUTERS** check the weight, temperature and capacity of the milk being stored in the silos.






# STEP 2 Standardize

Many milk trucks deliver fresh Wisconsin milk to cheese factories. All of this milk needs to be pasteurized. This means it gets heated to 165°F. Then it is tested for fat and protein, which are the parts of milk needed to make cheese. The fat and protein are then adjusted to **standardize** the milk in order to make yummy Wisconsin cheese.

**Did You Know?**  
Cheese is full of calcium to help keep teeth and bones strong. And protein, too, for strong muscles!



 **Curd's the Word!**  
**STANDARDIZE** • [v. stan-der-dahyz]  
To make something the same.



**The Science Behind the Science**

**LAB EQUIPMENT** is used to test the milk for fat and protein.

A close-up photograph showing a person's hand using a white pipette to dispense a small amount of liquid into a white bowl. The liquid in the bowl appears to be a mixture of milk and a pinkish substance, likely a test reagent. The background is slightly blurred, showing a white surface.

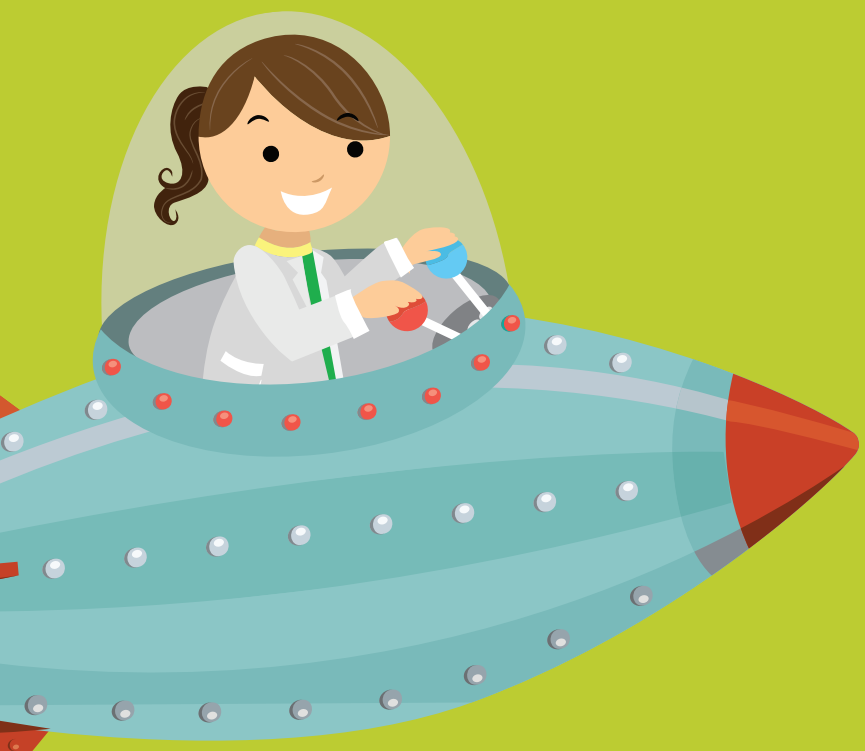


# STEP 3 Coagulate

Next, the milk is pumped into a stainless steel vat. Wisconsin cheesemakers then add starter cultures, or good bacteria, to start making cheese.

**Did You Know?**  
Good bacteria is important because it can help you digest your food and keep you healthy.

This good bacteria helps give the cheese flavor and texture. The cheesemaker then adds an enzyme, called rennet to the milk, which helps the milk **coagulate**, turning it into a yogurt-like substance.



**Curd's the Word!**

**COAGULATE** •  
[v. koh-ag-yuh-leyt]  
To change a liquid into a solid.



**The Science Behind the Science**  
**BIOTECHNOLOGY**, or living technology, is what's used in starter cultures to help milk start becoming cheese.



# STEP 4 Cut

Now it's time to start cutting! This begins the process of separating the liquid, called **whey**, from the milk solids, called curds.

**DID YOU KNOW?**  
There are more than 600 different varieties, types and styles of cheese made in Wisconsin.



**Curd's the Word!**  
**WHEY** • [n. hwey]  
The watery part of milk that separates from the solid curds during the cheesemaking process.



**The Science Behind the Science**  
**STRAINERS** look like nets or fences and are used to separate the solid curd from the liquid whey.



# STEP 5 Stir, Heat & Drain

Cheesemakers continue to cook and stir the curds and whey until it's as firm (or soft!) as they want it. The curds are then pushed to one end of the vat as the whey is drained away. This leaves tightly formed curds.

## Did You Know?

Whey may be drained, but is not forgotten. In fact, whey can be used to make hand lotion, baby formula, chocolate candy—even animal feed!



## The Science Behind the Science

**STAINLESS STEEL RAKES and MECHANICAL PADDLES** are used by cheesemakers to squeeze, stir and push the curds as they are cooked and heated. This helps remove the whey.





# STEP 6 Transform

Depending on the kind of cheese being made, the cheesemaker then blends, mixes and forms heaps of curds using good, old-fashioned muscle! This part is called **cheddaring**. Next, the piles of curds are chopped and salted to give the cheese extra flavor.



**Did You Know?**  
Salt also helps the liquid whey separate from the curd.



**Curd's the Word!**

**CHEDDARING** •  
[n. ched-er-ing]  
The flipping and turning of the heaps of curds to squeeze out remaining whey.



**The Science Behind the Science**  
The mass of curds gets mashed up and cut into chunks of cheese curds by **CURD MILLING MACHINES**.





# STEP 7 Press

Ever wonder how cheese gets made into different shapes? By pressing it, of course! Most Wisconsin cheese is pressed anywhere between 3 to 12 hours, depending on its size.

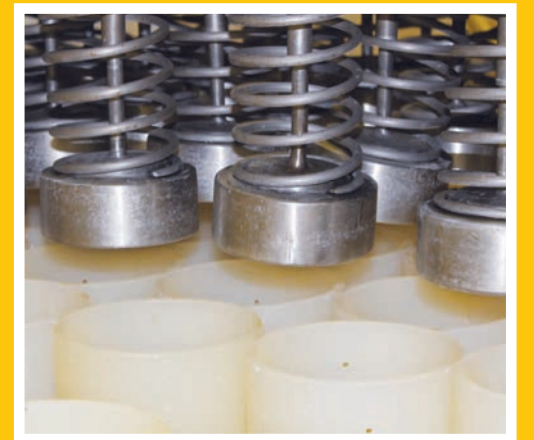
## Did You Know?

Wisconsin cheese comes in all kinds of shapes, such as rounds, wedges, logs, squares, cylinders and more.



## The Science Behind the Science

**MECHANICAL PRESSING MACHINES** help shape the cheese into blocks, as well as squeeze out any remaining whey.





# STEP 8 Cure

Some of the cheese then needs to sit and age, or **cure**. The cheese is cured in a room that is checked by a computer for humidity and temperature until it is ready to be packaged. During this process, Wisconsin cheesemakers check on the cheese every day.



## Did You Know?

In some cases, Wisconsin cheese may be aged for 10 years or more. Some are even aged for up to 20!



## Curd's the Word!

**CURE** • [v. kyoo r]  
The method by which cheese is aged or treated to give it a certain flavor.



## The Science Behind the Science

**REFRIGERATED ROOMS** are controlled by **COMPUTERS** that check temperature and humidity to be sure that Wisconsin cheese can cure.





# Time for some Wisconsin cheese!

And there you have it.

Wow, who knew something as delicious and good for you as cheese could have this much **science** behind it? As a kid scientist, my thirst for knowledge has definitely been quenched. Now, it's time to do something about my hunger. 😊

Science = Yum!



## The End.

