



## Food Science

**Brief Description:** Milk and milk products are rich in high quality protein and a great source of calcium. They provide three quarters of all the calcium in the diet. In addition, milk and milk products supply Vitamins A, Riboflavin, Phosphorus and Magnesium. Because milk is a complete protein, it complements many grains that are lacking in Lysine, one of the essential amino acids.

**Grade Level:** K-2

### **Materials List:**

Varies depending on experiment. See list below for the required materials for each activity.

#### Anticipatory Set

A variety of milk product containers such as cottage cheese, milk, ice cream, yogurt, etc.

#### Milk Science Experiment

Milk Science Experiment Handout, disposable dish, milk, food coloring, liquid dish soap

#### Mystery Messages Experiment

Mystery Messages Experiment Handout, skim milk, shallow container, Q-Tips, Unlined white paper, oven

#### Ice Cream

Ice Cream Handout, 2% milk, sugar, vanilla, salt, ice, pint size Ziploc bag, gallon size Ziploc bag

#### Dairy Dinosaur-Healthy Habits

Healthy Habits Worksheet, variety of different shapes and sizes of food objects (food models)

#### The Painter's Dance-Healthy Habits

Healthy Habits Worksheet, Eating with Ethan and Emily curriculum

### **Book Suggestion:**

*Milk: From Cow to Carton* by Alikei

**Time Needed:** 1 hour

### **Nebraska 4-H Learner Outcomes:**

Youth will gain knowledge and develop skills for making healthy and safe decisions in their daily lives.

**Lesson:****Anticipatory Set:**

Talk about the different products that are made up of milk. 5 minutes

**Activities:**

1) Read *Milk: From Cow to Carton* 10 minutes

2) Milk Science Experiment 15 minutes  
-see handout

3) Mystery Messages Experiment 15 minutes  
-see handout

4) Healthy Habits (Choose either Dairy Dinosaur or The Painter's Dance) 15 minutes  
-see handout

Alternate Activity-Making Ice Cream 15 minutes

**Reflection:**

Answering Sample Questions, varies depending on experiment

**Wrap-Up:**

Milk comes in a variety of forms. Each one helps us absorb the calcium that our bodies need for our bones to become strong. Bones are the structure that holds our bodies together.

**Extension:**

Look up the myplate.gov and talk about the other foods that will give our bodies the nutrients they need.

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## MILK SCIENCE EXPERIMENT

### **Ingredients:**

Milk  
Food coloring  
Liquid dish soap

### **Materials Needed:**

Disposable dish

### **Directions:**

1. Cover the bottom of the dish with milk.
2. Add a few drops of food coloring to the milk (do not stir) and then add a few drops of liquid dish soap.
3. Watch what happens to the colors!!!



### **Sample Questions:**

What will happen when we add the food coloring to the milk?  
Why do I not want to stir the food coloring into the milk?  
What happens when I add liquid dish soap?

### **Explanation:**

Milk is mostly water but it also contains vitamins, minerals, proteins, and tiny droplets of fat suspended in solution. Fats and proteins are sensitive to changes in the surrounding solution (the milk). When you add soap, the weak chemical bonds that hold the proteins in the solution are altered. It's a free for all! The molecules of protein and fat bend, roll, twist, and contort in all directions. The food color molecules are bumped and shoved everywhere, providing an easy way to observe all the invisible activity. At the same time, soap molecules combine to form a micelle, or cluster of soap molecules. These micelles distribute the fat in the milk. This rapidly mixing fat and soap causes swirling and churning where a micelle meets a fat droplet. When there are micelles and fat droplets everywhere the motion stops, but not until after you've enjoyed the show!

There's another reason the colors explode the way they do. Since milk is mostly water, it has surface tension like water. The drops of food coloring floating on the surface tend to stay put. Liquid soap wrecks the surface tension by breaking the cohesive bonds between water molecules and allowing the colors to zing throughout the milk. What a party!

## **MYSTERY MESSAGES**

### **Ingredients:**

Skim Milk

### **Materials Needed:**

Shallow container

Q-Tips

Unlined white paper

Oven (Warning – Adult supervision is needed for use of the oven!)

### **Directions:**

1. Pour milk into shallow container
2. Dip the Q-Tip into the milk.
3. Carefully write your message on paper.
4. Don't press too hard and don't use too much milk.
5. Let the milk dry on the paper until your message has disappeared. This may take about 15 minutes.
6. You can make your words come to light by placing your message in a 425 degree Fahrenheit oven for 60 seconds. If your message doesn't appear, leave it in a little longer. But be careful you don't want to leave it in too long and burn the paper.

### **Sample Questions:**

Do you think you will be able to see the message when the milk is placed on the paper?

Do you think you will be able to see the message after the milk dries on the paper?

Why do you think we will be able to read the message after placing the paper in the oven?



## ICE CREAM

### **Ingredients:**

½ Cup	2% milk
1 Tablespoon	Sugar
¼ Teaspoon	Vanilla
6 Tablespoons	Salt
Lots of ice	



### **Materials Needed:**

- 1 pint-size zip-type plastic bag
- 2 gallon-size zip-type plastic bags

### **Directions:**

1. Add the salt to one of the gallon-size bags.
2. Add ice to the same bag until it is half full, then set aside.
3. In the pint-size bag, add the milk, sugar, and vanilla.
4. Seal this bag well and place inside the large bag with the salt and ice. Seal well.
5. Now place this bag inside another gallon-size bag. (Use two large bags because the children may be very vigorous with their shaking and the bags may get holes in them!).
6. Shake the mixture for about 5 minutes.
7. Open bags and wipe off the top of the small bag, open carefully and enjoy.

### **Sample Questions:**

- What will happen to the milk and sugar mixture?
- How did the ice cream mixture become a solid?
- Why did we put salt in the ice?
- Why is the ice cream sweet?

## **HEALTHY HABITS:**

### **Dairy Dinosaur**

This game will help children develop finger coordination and eye-hand coordination.

#### **Materials Needed:**

A variety of different shapes and sizes of food objects (food models would work.)

#### **Directions:**

1. Have children sit in a circle, then distribute the objects among the players in the circle.
2. When you give the start signal, the children are to quickly pass the food models around the circle, with each child handing the object to the child next to him or her, without dropping it.
3. If an object is dropped, the child who dropped it must pick it up and pass it on to the next person.
4. When the signal to stop is given, those with a milk product in their hand are the dairy dinosaur.

Tips: The signal to start and stop could be musical. Have players caught with dairy products in their hands go to the middle of the circle and perform a task, such as acting like a cow for 10 seconds or doing five jumping jacks. As soon as the child performs the assigned task, he or she can rejoin the circle. Then you can start the game all over again.

### **The Painter's Dance**

This activity allows children to imagine they are artists who can draw with every part of a cow's body. It's a great way to encourage them to move their whole body and activate their imaginations.

#### **Directions:**

Tell your children they are going to pretend to paint a huge picture on the side of the wall. It's going to be a beautiful picture but they only have a short time to paint it. Therefore they are going to paint with both hands as well as other body parts. First of all activate the children imaginations by asking them what type of picture they would like to draw (animals, flowers, etc.). Next have them begin to paint this picture in the air with one hand after 10 to 20 seconds switch to other ways of painting:

forehead	nose	jaw
one ear then the other	one shoulder than the other	hips
one elbow then the other	one knee then the other	stomach
one foot then the other	both feet (on their backs)	both knees

Then say: "Oh no! Time is running out so let's paint faster how about painting with..."

both hands and nose	both elbows and jaw
both elbows and knees	both shoulders and hips
nose and knees	jaw and hips
one ear and one foot	one ear and the other foot
both hands and one foot	both hands and the other foot

Finally have your children lie down on their backs and paint with both feet, both hands and their nose. After 5 minutes their bodies should be all warmed up and a masterpiece will be created in their minds.

**Source:** *Eating with Ethan and Emily*