

## FUN FACES OF WISCONSIN AGRICULTURE HOLLY HOLSTEIN'S DAIRY FAST FACTS



### Production Information

Dairy animals (bovines) are ruminant animals that have stomachs with four compartments. A mature cow will eat 20-25 pounds of grain, 40-60 pounds of ensilage, 30 pounds of hay, and drinks about 15-25 gallons of water each day (about a bathtub full). She will spend up to 8 hours chewing her cud as she breaks down her food. A cow will be bred so that her first calf is born when she is about 24 months of age. Gestation (time from breeding to birth) is about 279-290 days or nine months. Cows may be bred with a bull, artificially or through embryo transfer. There are six major dairy breeds so the cow size (average 1600 pounds), calf birthing weight (70-110 pounds) and milk production levels will vary. The major breeds are Holstein, Brown Swiss, Jersey, Guernsey, Milking Shorthorn and Ayrshire. A cow will normally have one calf once a year. She will have a rest period (dry period) for about 6-8 weeks prior to the birth of her next calf; she won't produce milk and her body is able to concentrate on the new calf inside her. A cow is milked on average for 305 days. Most farms milk either 2 or 3 times per day. The average Wisconsin cow gives 56 pounds (about 6.5 gallons) of milk per day. Milking machines are designed to simulate the calf's suckling motion. Barns will vary in style, size and design. Dairy farms will vary in size and how animals are fed. Milk is taken from the dairy barn to processing plants. Proper cooling of milk is needed at all times. Barns and milk plants are inspected for food safety standards.

### Wisconsin Production

The dairy industry contributes \$20.6 billion in revenue annually. Dairy provides 40% of all agricultural related jobs (4.6% of all jobs in the state with over 160,000 dairy related workers. Wisconsin has 14,490 herds with over 1.2 million dairy cows. The average number of cows per farm is 86. Wisconsin accounts for more than 1/5 of the nation's total dairy exports or \$224 million annually. The average dairy cow generates more than \$17,000 in economic activity. There are 202 dairy plants including 116 cheese plants.

### Career Information

Producers rely on many consultants to help them on a daily basis: nutritionist (feeding cows), crop scouts (growing feed), artificial inseminators (breeding cows), housing specialists (ventilation and building design), mechanics (keeping machinery operating), truck drivers (hauling milk, feed and machinery), accountants (advising business decisions and money handling), advertisers (helping sell end products), and many others!

### Trivia

- 90% of Wisconsin cheese is sold out-of-state.
- The average American eats 31 pounds of cheese each year.
- It takes 10 pounds of milk to make 1 pound of cheese and 12 pounds of milk to make 1 gallon of ice cream.
- One gallon of milk weighs 8.6 pounds.
- 89% of WI farms are family owned.

### Other Information

Cow- adult female that has produced a calf

Bull- male animal

Steer- male animal that has been castrated and cannot breed

Heifer- young female that has not produced a calf

Calf- young dairy animal (either sex)

Wisconsin is called "America's Dairyland" because of our 160 years of dairy experience. Wisconsin cheese plants produce over 600 types of cheese. Dairy cows utilize the many forages grown in our state.

Methane digesters produce methane from manure. Methane can be used to produce energy or electricity. Because manure is important for soil structure and nutrients, cows are natural recyclers.

**FUN FACES OF WISCONSIN AGRICULTURE**  
**MATH - DAIRY LESSON PLAN**



**STUDENT'S NAME:**

Answer the questions below. Show your work.

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1. One gallon of milk weighs 8.6 lbs, how many gallons of milk would it take to equal your weight?
  
  
  
  
  
  
  
  
  
  
2. If a cow produces about 70 pounds of milk per day, how many gallons is that (round your answer to the nearest whole number)?
  
  
  
  
  
  
  
  
  
  
3. There are 8 pints in a gallon. If one milk carton is  $\frac{1}{2}$  pint, how many milk cartons of milk does a cow produce each day (hint: use the answer from Question #2).
  
  
  
  
  
  
  
  
  
  
4. If each student in your class drank one carton of milk at breakfast and one carton at lunch, how many gallons would that be? How many cows will it take to make that much milk?
  
  
  
  
  
  
  
  
  
  
5. If you can milk 80 cows each hour, how long will it take to milk 640 cows?

6. On your farm, cows can be milked in groups of five cows at a time. If you have 13 cows left, and will only bring in 3 groups, what are the ways that the cows can be grouped?

7. On your neighbor's farm, the cows are 58 inches tall and 23 inches wide. She asks you to help her plan her new barn. To make sure the cows are comfortable in their stalls, you multiply their height by two to find the length of the stall and their width by two to find the width of the stall. Using these formulas, what should the dimensions of the stall be?

8. In Wisconsin, 89.1% of farms are owned by individuals and families, 6.9% are owned by partnerships of families, 3.3% are owned by family corporations, and 0.7% are 'other'. What percentage of Wisconsin farms are owned by some sort of family? Draw a pie chart of the Wisconsin Dairy Farm Ownership using this data.

**ANSWER KEY**

1. One gallon of milk weighs 8.6 lbs, how many gallons of milk would it take to equal your weight?

**Answers will vary depending on the weight of the student!**

*95 lbs (use the student's weight) / 8.6 lbs of milk in one gallon =  
11.04 gallons of milk to equal student weight*

2. If a cow produces about 70 pounds of milk per day, how many gallons is that (round your answer to the nearest whole number)?

*70 lbs / 8.6 lbs per gallon = 8.1 or rounded to 8*

3. There are 8 pints to a gallon. If one milk carton is  $\frac{1}{2}$  pint, how many milk cartons of milk does a cow produce each day (hint: use the answer from Question #2).

*2 cartons in a pint X 8 pints in a gallon = 16 cartons in a gallon  
8 gallons produced each day X 16 cartons per gallon = 128 cartons of milk  
produced in one day*

4. If each student in your class drank one carton of milk at breakfast and one carton at lunch, how many gallons would that be? How many cows will it take to make that much milk?

**Answers will vary depending on the number of students in the class!**

*24 students in the class X 2 cartons each day = 48 cartons  
48 cartons / 16 cartons in a gallon = 3 gallons  
8 gallons per cow per day / 3 gallons needed by the class = 2.6 (one cow could produce two  
and a half days worth of milk for the class)*

5. If you can milk 80 cows each hour, how long will it take to milk 640 cows?

*640 cows / 80 cows per hour = 8 hours to milk 640 cows*

6. On your farm, cows can be milked in groups of five cows at a time. If you have 13 cows left, and will only bring in 3 groups, what are the ways that the cows can be grouped?

*Group One: five cows, Group Two: five cows, Group Three: three cows  
Group One: five cows, Group Two: four cows, Group Three: four cows*

7. On your neighbor's farm, the cows are 58 inches tall and 23 inches wide. She asks you to help her plan her new barn. To make sure the cows are comfortable in their stalls, you multiply their height by two to find the length of the stall and their width by two to find the width of the stall. Using these formulas, what should the dimensions of the stall be?

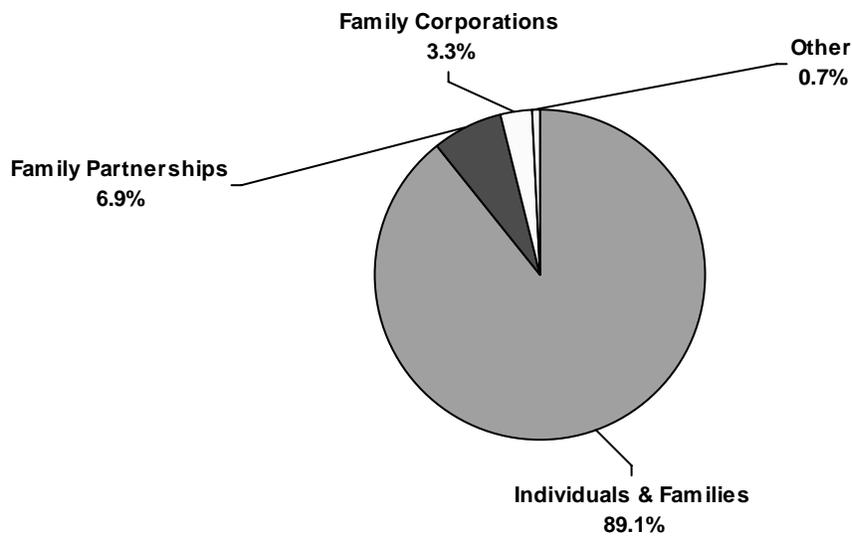
$$58 \text{ inches long} \times 2 = 116 \text{ inches for the stall length}$$
$$23 \text{ inches wide} \times 2 = 46 \text{ inches for the stall width}$$

8. In Wisconsin, 89.1% of farms are owned by individuals and families, 6.9% are owned by partnerships of families, 3.3% are owned by family corporations, and 0.7% are 'other'. What percentage of Wisconsin farms are owned by some sort of family?

$$89.1 + 6.9 + 3.3 = \underline{99.3\%}$$

Draw a pie chart of the Wisconsin Dairy Farm Ownership using this data.

## Wisconsin Dairy Farm Ownership



**FUN FACES OF WISCONSIN AGRICULTURE  
DAIRY ECONOMICS LESSON PLAN**



**Activity Length:**

Food Dollar- 30 minutes

Community Money- 30 minutes

Who works for the Dairy Industry?- 45 minutes

Dairy Math Lesson – 30 minutes

**Student Objectives:**

- Students will use problem solving skills to determine the parts of a dollar that go into production of food.
- Students will determine the Dairy's economic impact in the community
- Students will identify the businesses in the local community that are impacted by the dairy industry.

**Wisconsin Model Academic Standards:**

English	A.4.2	A.4.4	C.4.1			
Math	A.4.2	A.4.5	D.4.1	D.4.2	D.4.4	E.4.3
Social Studies	D.4.2	D.4.3	E.4.7			

**Introduction:** Holly Holstein's Dairy Fast Facts

**Important Terms:**

- Packaging- putting the product into containers and labeling it for consumers
- Transportation- moving the raw product or processed product from one place to another
- Energy- cost of resources such as fuels, electricity to produce or process products
- Profit- Gross Income minus Gross expenses
- Advertising- promotion using media sources such as television, radio, websites and print media
- Depreciation - decrease or loss in value of equipment, as because of age, wear, or market conditions
- Rent- amount paid to use something
- Interest - a percentage per year of the amount of money borrowed
- Repairs- the cost to fix something
- Business Taxes – the taxes that a business must pay on products sold, employee and personnel related expenses and on property owned.

**Materials for this activity:**

Community Money Worksheet and Answer Key

Where Your Food Dollar Goes Worksheet

Dairy Businesses in My Community

## **Lesson Outline:**

### **Food Dollar**

*Students will use problem solving skills to determine where the \$.81 of their food dollar goes off the farm.*

1. Distribute the Where your Food Dollar Goes worksheet.
2. Students should use problem solving skills to match the money spent on each area with the places the money goes.
3. To help answer the worksheets, use the Where Your Food Dollar Goes poster available from American Farm Bureau ([www.fb.org](http://www.fb.org))
4. Discuss where those businesses can be found and the importance of each of the places where the money goes. What are some ways to reduce or eliminate the amount of money spent so the farmer sees a bigger profit?

### **Community Money**

*Students will use math skills to change percent into dollars and determine the economic impact of a 250 cow dairy farm on the local community businesses.*

1. Distribute the Community Money Worksheet and define the areas where the money goes.
2. Instruct students on how to use a calculator to calculate percent.
3. Calculate how much money is spent in each of the areas from one farm.

### **Who works for the Dairy Industry?**

*Identify local businesses that help to support the industry.*

1. Using the Dairy Businesses in My Community, brainstorm businesses that may be attached to each of the areas on the community money worksheet.
2. Using the businesses from the Community Money Worksheet and phone books or local chamber of commerce publications, have students identify the local businesses that are impacted by the dairy industry.

### **Dairy Math Lesson**

1. Distribute Dairy Math Worksheet as a classroom activity or homework assignment

### **Suggested Reading Materials:**

- *Extra Cheese, Please! Mozzarella's Journey from Cow to Pizza.* By Cris Peterson, Boyds Mills Press, 1994.
- *Hooray for Dairy Farming!* By Bobbie Kalman, Crabtree Publishing, 1998.

**Additional Worksheets:**

- Careers Guide related to dairy
- Ag Statistics Lesson Plan related to dairy

**Related activities:**

- Bring in local industry and business people to tell about their jobs.
- Assign different businesses to groups of students and have them conduct phone interviews to learn more about their business.
- Download Milk and Math Lesson Plans from the Wisconsin Milk Marketing Board ([www.wisdairy.com](http://www.wisdairy.com))
- Download Dairy Statistics from the Wisconsin Milk Marketing Board ([www.wisdairy.com](http://www.wisdairy.com))
- Visit local businesses or places listed on the Ag/Dairy Field Trip List from the Wisconsin Milk Marketing Board ([www.wisdairy.com](http://www.wisdairy.com))

**FUN FACES OF WISCONSIN AGRICULTURE**  
**WHERE YOUR FOOD DOLLAR GOES**



Match the amount in the first column to the item it is spent on in the second column using the clues provided.

38.5¢

Packaging

8¢

Business Taxes

4.5¢

Energy

4.5¢

Other Costs

4¢

Rent

4¢

Off-Farm Labor

3.5¢

Repairs

3.5¢

Profits

3.5¢

Transportation

3¢

Interest

2.5¢

Depreciation

1.5¢

Advertising

Clues:

Repairs are the lowest expense

Transportation and advertising cost the same

Transportation and advertising are more than depreciation and less than rent

Packaging costs two times the value of advertising

Off-farm labor is the greatest expense

Energy, depreciation and business taxes are equal

Other costs are two times repairs

Profits and rent are equal

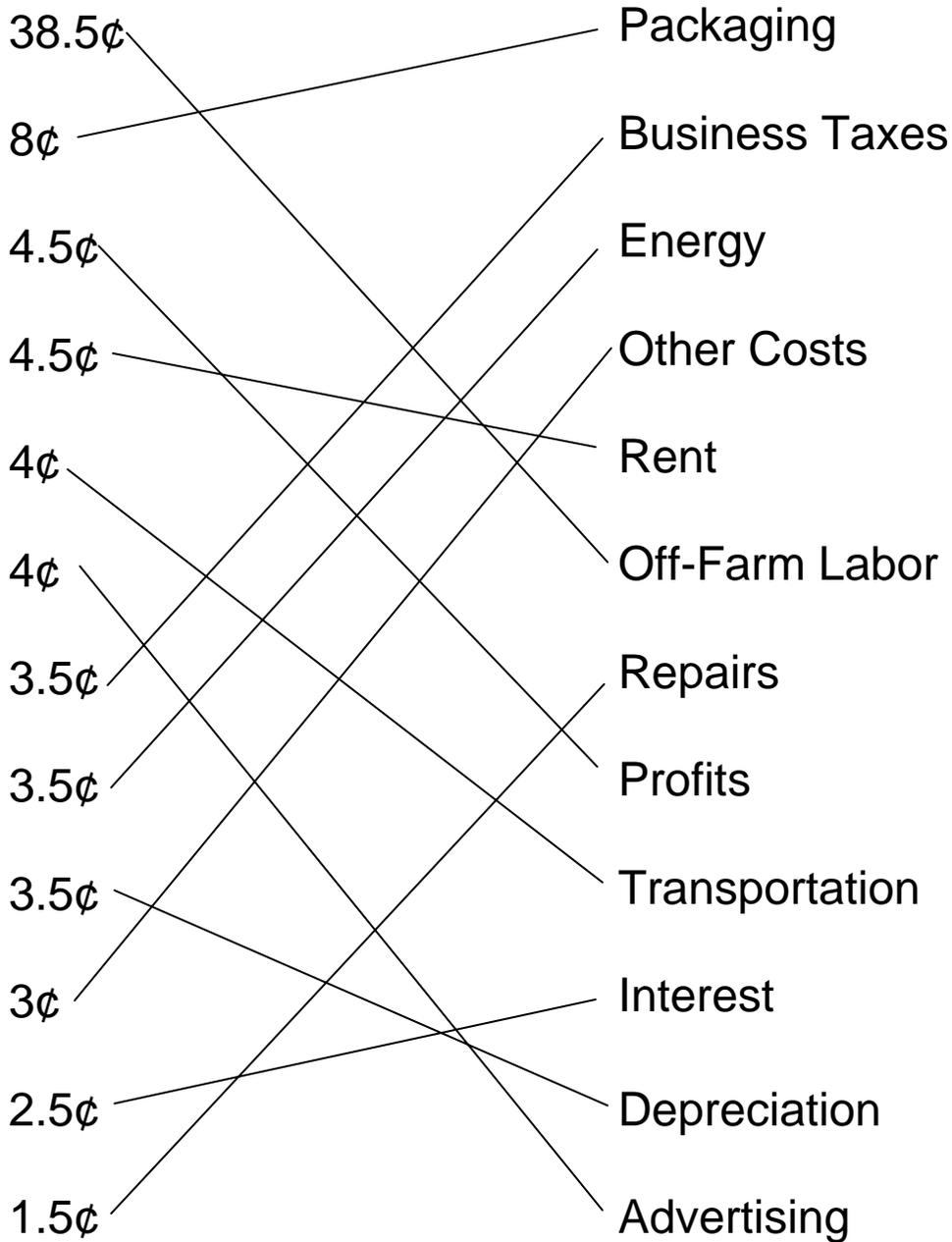
Interest is more than repairs and less than other costs

Profits and rent are more than transportation and less than packaging expenses

FUN FACES OF WISCONSIN AGRICULTURE  
WHERE YOUR FOOD DOLLAR GOES



ANSWER SHEET



**FUN FACES OF WISCONSIN AGRICULTURE  
COMMUNITY MONEY WORKSHEET**



**Information:**

A 250 cow Wisconsin Dairy farm contributes \$675,000 per year to the local economy through the following ways:

\$175,000 at local retailers

\$157,000 in feed supplies

\$111,000 for employee wages and benefits

\$45,000 in interest payments at the bank

\$39,000 in land rent to neighbors

\$37,000 at equipment dealers

\$36,000 in supplies at the local cooperative

\$28,000 at the veterinary clinic

\$20,000 for local consultant services (building and nutrition)

\$18,000 in utility bills

\$9,000 in property taxes

**\*information taken from the UW-Madison's Center for Dairy Profitability (2003)**

## **Problems:**

1. Using the information provided, calculate the expenses into a percentage of the whole \$675,000.
  - a. Local retailers:
  - b. Feed Supplies:
  - c. Employee Wages and benefits
  - d. Interest Payments at the bank
  - e. Land rent to neighbors
  - f. Equipment dealers
  - g. Supplies at the local cooperative
  - h. Veterinary clinic
  - i. Local consultant services
  - j. Utility bills
  - k. Property taxes
  
2. Using this information, create a pie graph to show where the money ends up

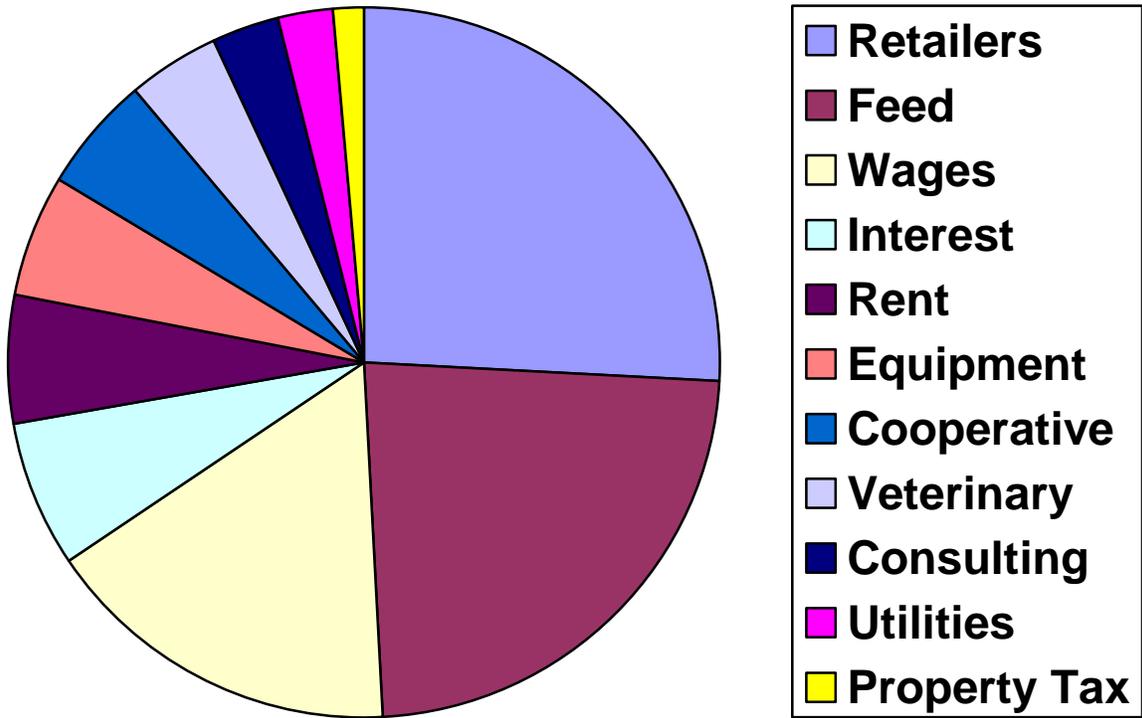
**FUN FACES OF WISCONSIN AGRICULTURE  
COMMUNITY MONEY - ANSWER SHEET**



1. Using the information provided, calculate the expenses into a percentage of the whole \$675,000.

- a. Local retailers:  $175,000/675,000 = 0.259$  or 25.9%
- b. Feed Supplies:  $157,000/675,000 = 0.233$  or 23.3%
- c. Employee Wages and benefits:  $111,000/675,000 = 0.164$  or 16.4%
- d. Interest Payments at the bank:  $45,000/675,000 = 0.067$  or 6.7%
- e. Land rent to neighbors:  $39,000/675,000 = 0.058$  or 5.8%
- f. Equipment dealers:  $37,000/675,000 = 0.055$  or 5.5%
- g. Supplies at the local cooperative:  $36,000/675,000 = 0.053$  or 5.3%
- h. Veterinary clinic:  $28,000/675,000 = 0.041$  or 4.1%
- i. Local consulting services:  $20,000/675,000 = 0.030$  or 3%
- j. Utility Bills:  $18,000/675,000 = 0.027$  or 2.7%
- k. Property Taxes:  $9,000/675,000 = 0.013$  or 1.3%

2. Using this information, create a pie graph to show where the money goes



**FUN FACES OF WISCONSIN AGRICULTURE  
DAIRY BUSINESSES IN MY COMMUNITY**



Student \_\_\_\_\_

<b>Types of Services</b>	<b>Brainstorm what businesses provide this service</b>	<b>Names of businesses in my community that provide this service</b>
Local retail needs		
Feed supply		
Provide money		
Land- rent or buy		
Equipment		
Feed, seed, supplies or fertilizer		
Veterinary service		
Consultant services		
Utilities		
Other		

# FUN FACES OF WISCONSIN AGRICULTURE

## FARM TO FAMILY LESSON PLAN



### **Activity Length:**

Farm to Family- Video is 27 minutes. Follow-up activities – 15 minutes per worksheet

What happens?- 20 minutes

What to Make with Milk? – 45 minutes

Dairy Math Lesson – 30 minutes

### **Student Objectives:**

- Students will watch a video lead by students to learn about the processing of dairy products
- Students will match word definitions to unknown words to define the process of milk handling
- Students will use math conversion skills to determine the amount of specific dairy products that can be made from a set amount of milk
- Students will create an edible dairy product in the classroom

### **Wisconsin Model Academic Standards:**

English	A.4.2	A.4.4	C.4.1			
Math	A.4.2	A.4.5	D.4.1	D.4.2	D.4.4	E.4.3
Social Studies	D.4.2	D.4.3	E.4.7			

### **Introduction: Holly Holstein's Dairy Fast Facts**

### **Important Terms:**

- Testing: performing checks to ensure healthy and safe food
- Pasteurization: Milk is heated to 160 degrees Fahrenheit and then cooled quickly. This makes milk safe to drink and helps it to stay fresh longer. It was named for Louis Pasteur who discovered that high temperatures kill bacteria.
- Homogenization: Fat is broken by machine into small pieces and distributed evenly throughout the milk. This prevents cream from forming in each package.
- Packaging: Milk is placed into cartons and jugs with labels indicating nutritional information.
- Delivering: Refrigerated trucks bring milk to schools and supermarkets for you to enjoy.
- Trucking: Milk is collected from the farm in a cooled tank truck and brought to the plant to be processed.

### **Materials for this activity:**

- Farm to Family Video (27 minutes) and worksheets - available free from ([www.wisdairy.com](http://www.wisdairy.com))
- Dairy Processing Steps handout
- What to Make with Milk? handout and answer key

- Plastic Bag Ice Cream: plastic bags (sandwich sized and gallon sized), heavy whipping cream, rock salt, sugar, vanilla, ice
- Homemade Butter: Small containers with lid (baby food jar size), heavy cream, salt, colander

### **Lesson Outline:**

#### Farm to Family

*Students will watch a video of two students going through the production and processing steps of dairy products. The Wisconsin Milk Marketing Board (WMMB) also has available worksheets to go with this video to utilize this as a separate lesson in itself. The video is free. Worksheets and curriculum can be downloaded from ([www.wisdairy.com](http://www.wisdairy.com)), click on Special Offer, Educational Videos.*

1. Students will watch the *Farm to Family* video.
2. Ask the following questions: How many students live on a farm? Have visited a farm? Who has ever visited a cheese plant? Discuss the differences from the video and the students who have visited a farm or cheese plant. Encourage them to share their experiences with the class.
3. Complete the worksheet Wisconsin – The Dairy State. Additional information can be found on Wisconsin Agriculture Farm Facts ([www.wisagclassroom.org](http://www.wisagclassroom.org))
4. If desired, utilize the *WMMB Farm to Family* worksheets for the students to review the video information.

#### What happens?

*Students will begin by defining the terms in processing dairy products and then put them in proper order.*

1. Make a copy of Dairy Processing Steps. Cut it up into small cards.
2. Divide students into groups and pass out the definition cards and the words.
3. Give instructions to match with the words and definitions.
4. Have each group put the cards in the proper order or sequence.
5. As a class, discuss each of the steps in the process.

#### What to Make with Milk?

*Utilizing math skills, students will calculate the amount of products that can be made from defined amount of milk.*

1. Distribute the What to Make with Milk worksheet to the students.
2. Individually, or in groups have them calculate the answers to the questions on the worksheets.

3. Discuss why it takes more or less milk to make different products.
4. What other ingredients go into production of these products?
5. Make Homemade Butter or Plastic Bag Ice Cream in the classroom.

#### Dairy Math Lesson

1. Distribute Dairy Math Worksheet as a classroom activity or homework assignment.

#### **Suggested Reading Materials:**

- *Extra Cheese, Please! Mozzarella's Journey from Cow to Pizza.* By Cris Peterson, Boyds Mills Press, 1994.
- *Hooray for Dairy Farming!* By Bobbie Kalman, Crabtree Publishing, 1998.

#### **Additional Worksheets:**

- Careers Guide related to dairy
- Ag Statistics Lesson Plan related to dairy
- Homemade Butter
- Plastic Bag Ice Cream
- Wisconsin – The Dairy State

#### **Related activities:**

- Visit World Dairy Expo, dairy farm or cheese plant in the area
- Make crafts from worksheets in *Farm to Family* curriculum packet
- *Dairy Ag Mag* – available from ([www.wisagclassroom.org](http://www.wisagclassroom.org))

**FUN FACES OF WISCONSIN AGRICULTURE  
DAIRY PROCESSING STEPS**



Copy and cut apart to distribute to groups of students. Match one bold step in the process to the italic definition of that step.

<b>The farmer feeds the cow a balanced diet so she may produce milk.</b>	<i>The cow needs to be healthy to produce milk naturally.</i>
<b>The dairy farmer cleans the cow's udder.</b>	<i>To make sure the cow stays healthy and the milk is as clean as possible.</i>
<b>The cow is milked.</b>	<i>Through the use of specialized machines that are designed to be comfortable to the cow.</i>
<b>The milk goes into the bulk tank at the farm where it is kept cold.</b>	<i>Maintained at a healthy temperature keep it safe to drink.</i>
<b>The milk is tested at the farm and then taken to the processing plant.</b>	<i>Testing ensures that the milk is safe before it is mixed in the truck with milk from other farms.</i>
<b>The milk is tested at the processing plant.</b>	<i>To make sure that the milk is safe, it is tested again before being processed.</i>
<b>The milk is pasteurized and homogenized.</b>	<i>Pasteurized milk is heated to at least 160°F for 15 seconds to destroy bacteria. Homogenization disperses fat particles and ensures that the milk has consistent flavor.</i>
<b>The products are packaged and delivered to stores, restaurants and schools.</b>	<i>To ensure that you have delicious dairy products available to you wherever you eat.</i>
<b>You drink milk, eat cheese, and have ice cream for dessert.</b>	<i>Because 3-4 glasses of milk each day provide calcium and other nutrients to keep you healthy.</i>

## CORRECT STEPS



**Step One:**  
The farmer feeds the cow a balanced diet so she may produce milk.

*The cow needs to be healthy to produce milk naturally.*

**Step Two:**  
The dairy farmer cleans the cow's udder.

*To make sure the cow stays healthy and the milk is as clean as possible.*

**Step Three:**  
The cow is milked.

*Through the use of specialized machines that are designed to be comfortable to the cow.*

**Step Four:**  
The milk goes into the bulk tank at the farm where it is kept cold.

*Maintained at a healthy temperature keep it safe to drink.*

**Step Five:**  
The milk is tested at the farm and then taken to the processing plant.

*Testing ensures that the milk is safe before it is mixed in the truck with milk from other farms.*

**Step Six:**  
The milk is tested at the processing plant.

*To make sure that the milk is safe, it is tested again before being processed.*

**Step Seven:**  
The milk is pasteurized and homogenized.

*Pasteurized milk is heated to at least 160°F for 15 seconds to destroy bacteria. Homogenization disperses fat particles and ensures that the milk has consistent flavor.*

**Step Eight:**  
The products are packaged and delivered to stores, restaurants and schools.

*To ensure that you have delicious dairy products available to you wherever you eat.*

**Step Nine:**  
You drink milk, eat cheese, and have ice cream for dessert.

*Because 3-4 glasses of milk each day provide calcium and other nutrients to keep you healthy.*

**FUN FACES OF WISCONSIN AGRICULTURE  
WHAT TO MAKE WITH MILK**



What to Make with Milk?

Using the conversion factors below, answer the questions and show your work.

Milk Conversion Factors:

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One quart of milk weighs 2.15 lbs.

One gallon of milk weighs 8.6 lbs.

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*To make one pound of.....you need:*

Butter	21.8 lbs whole milk
Cheese	9.8 lbs whole milk
1 gallon Ice Cream	12.0 lbs whole milk
Plain Yogurt (not low fat)	1 lb whole milk

Source: USDA

Can any products be produced with just one gallon of milk?

How many pounds of milk are in five gallons?

How many gallons of ice cream can be made with five gallons of milk?

What products could be made with two gallons and three quarts of milk?

How many gallons of milk would you need to make 5 gallons of ice cream?

**FUN FACES OF WISCONSIN AGRICULTURE  
WHAT TO MAKE WITH MILK-ANSWER KEY**



ANSWER KEY

Using the conversion factors below, answer the questions and show your work.  
Milk Conversion Factors:

---

One quart of milk weighs 2.15 lbs.  
One gallon of milk weighs 8.6 lbs.

---

<i>To make one pound of.....</i>	<i>.....you need:</i>
Butter	21.8 lbs whole milk
Cheese	9.8 lbs whole milk
1 gallon Ice Cream	12.0 lbs whole milk
Plain Yogurt (not low fat)	1 lb whole milk

Source: USDA

Can any products be produced with just one gallon of milk?

*Only plain yogurt*

How many pounds of milk are in five gallons?

*8.6 pounds per gallon X 5 gallons = 43 pounds of milk*

How many gallons of ice cream can be made with five gallons of milk?

*43 pounds / 12 pounds = 3.6 so only three gallons can be made*

What products could be made with two gallons and three quarts of milk?

*2 gallons X 8.6 pounds = 17.2 pounds of milk*

*3 quarts X 2.15 pounds = 6.45 pounds of milk*

*17.2 pounds + 6.45 pounds = 23.65 pounds of milk*

*One gallon ice cream, one pound cheese, one pound plain yogurt = 22.8 lbs*

*Or one pound of butter and one pound of plain yogurt = 22.8 pounds*

How many gallons of milk would you need to make 5 gallons of ice cream?

*5 gallons X 12 lbs milk = 60 pounds of milk*

*60 pounds of milk / 8.6 lbs in a gallon = 6.98 gallons milk*



# Plastic Bag Ice Cream

This activity is a good supplement to a lesson on dairy farming and dairy products. Ice cream can be made in the classroom using the principle that adding salt to the ice between the plastic bags lowers the freezing point of water. Heat energy is transferred easily from the milk through the plastic bag to the salty ice water causing the ice cream mixture to freeze and the ice to melt.

## Materials Needed (each student):

- 1 quart resealable freezer bag
- 1 pint resealable freezer bag
- 1 Tablespoon sugar
- ¼ tsp. vanilla extract
- ¼ cup rock salt
- ¼ cup milk (whole or 2%)
- ¼ cup whipping cream or half & half
- plastic spoon
- 8 oz. sundae cup

## Teacher's Materials:

- measuring cup
- duct tape
- large serving spoons
- Ice cream flavorings (optional)
- Ice
- cloth towels or mitts
- water

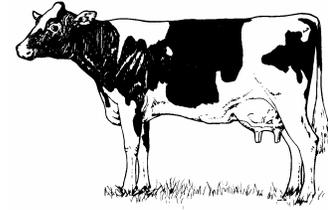
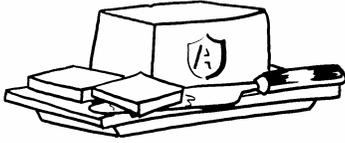
## Procedure:

1. Set up the milk, whipping cream, vanilla, and sugar in an assembly line process for students to help reduce congestion.
2. Add 1/4 cup milk, 1/4 cup whipping cream, 1 tablespoon sugar, and 1/4 teaspoon vanilla to a 1 pint freezer bag for each student. Squeeze out any remaining air, seal tightly and use a strip of duct tape to double-seal the end of the bag.
3. Students will place the pint bag with the ice cream ingredients inside a 1 quart resealable bag. Pack ice around the small bag and add the rock salt and 1/4 cup water. Squeeze out any remaining air in the 1 quart bag, seal the bag, and then double-seal the end using the duct tape.
4. Students should carefully shake the bags between their hands while protecting their hands with cloth towels or mitts. This should be done until you can see that the ice cream is frozen.
5. Each group can open the outer bag and discard the ice and salt. Rinse the outside of the bag containing the ice cream ingredients prior to spooning the ice cream into sundae cups for the students to eat. Use the large spoon to serve the ice cream.
6. Eat the ice cream plain or with your favorite toppings and enjoy. Caution: Students who are allergic to milk or milk products should not eat the ice cream.
7. Clean up all laboratory equipment and discard paper sundae cups and plastic spoons.

## Ice Cream Trivia:



- Nearly 9% of the milk produced by U.S. dairy farmers is used to make ice cream.
- It takes 12 pounds of milk to make one gallon of ice cream.
- One gallon of ice cream weighs at least 4 ½ pounds, with a minimum 10% milk fat.
- In 1984, President Ronald Reagan declared July as National Ice Cream Month, and National Ice Cream Day as the third Sunday in July.
- America's top 5 favorite flavors are, in order: vanilla, chocolate, Neapolitan, butter pecan, and chocolate chip.
- The U.S. Ice Cream industry generates about \$20 billion in annual sales.



# Homemade Butter

This simple activity is a good supplement to a lesson on dairy farming and dairy products.

Butter is made from cream, a component of milk. Cream is lighter than the rest of the milk and floats to the top, where it can be skimmed off and packaged separately. One pound of butter is made from the cream found in ten quarts of milk.

The more butterfat milk contains, the more butter it will make. The Jersey breed of cattle produces milk with the highest percentage of butterfat. The Holstein breed gives the greatest quantity of milk, but with the lowest percentage of butterfat.

Today, most people purchase commercially-made butter at the supermarket. Years ago, however, most people made butter at home using a butter churn. A typical butter churn consisted of a container to hold cream, which was then stirred briskly using a stick or paddle. The cream thickened as it was stirred, resulting in butter and buttermilk (the remaining liquid).

## Materials Needed:

- Jar (pint-sized). Can be glass or plastic. 2-ounce cups with lids also work well.
- Heavy whipping cream, preferably at room temperature.
- Salt
- Crackers

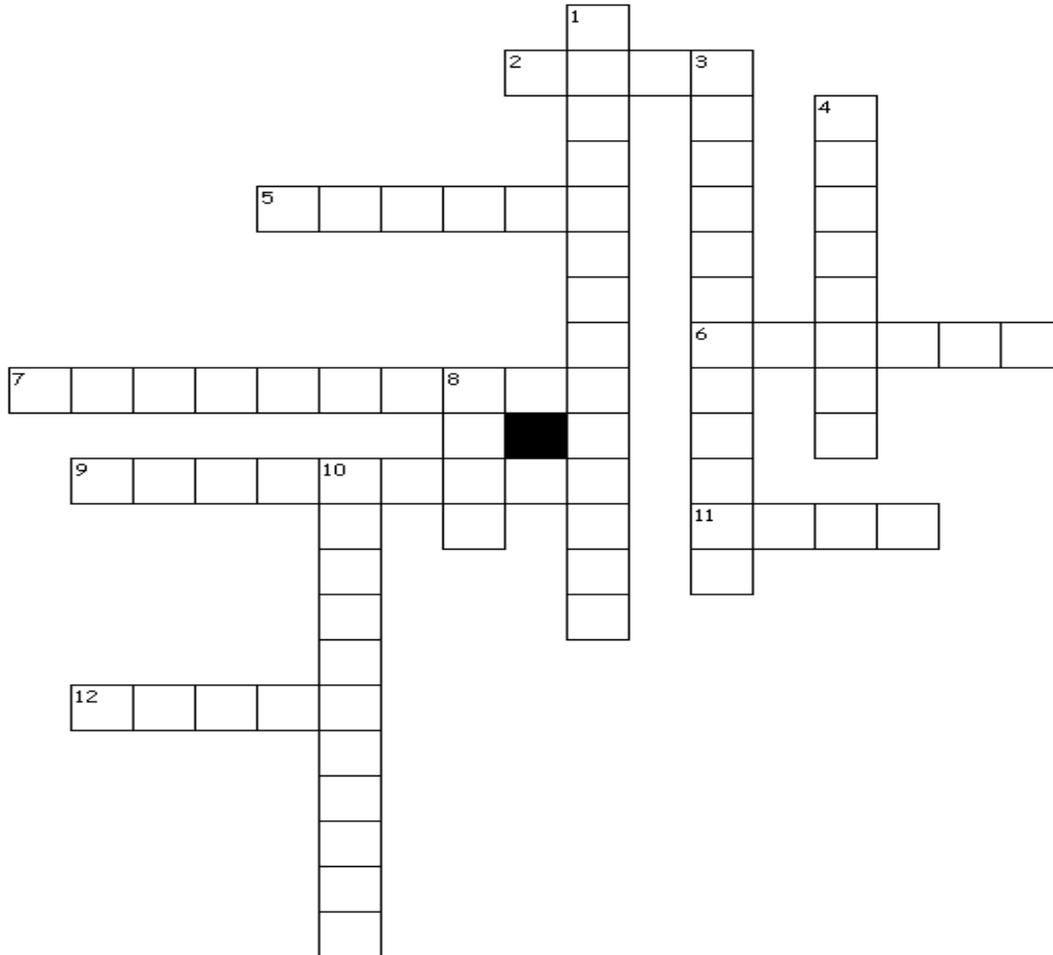
## Procedure:

1. Fill jar or cup 2/3 full with whipping cream. Firmly secure lid. Be sure to leave some space in the container.
2. Shake container briskly for 5-10 minutes (the more cream in the container, the longer it will take). Continue shaking until the butter is a solid lump in the jar. Once the butter has formed, open the jar and pour off the buttermilk.
3. To make salted butter, add salt after the butter is formed.
4. Spread butter on crackers and enjoy!

## Variations:

- For an experiment, try salting before shaking.
- Experiment by having students record the temperature of cream when beginning, length of time, and number of shakes it takes for butter to form.
- Instead of using heavy whipping cream (44% cream), try using light cream (18% cream), regular milk (3.5% cream), and 2% milk (2% cream). Have students compare the results.

**FUN FACES OF WISCONSIN AGRICULTURE**  
**WISCONSIN – THE DAIRY STATE**



**Across**

2. American's spend 10% of their disposable income on this
5. Wisconsin's ranking in milk production
6. Wisconsin ranks #1 in production
7. Where dairy cattle may be shown by 4-H and FFA members
9. Agriculture is 12% of Wisconsin's
11. There are over 1.2 million in Wisconsin
12. Average number of days an American must work to earn enough money to pay for their food for one year

**Down**

1. Held in October in Madison
3. College major that focuses on the dairy industry
4. Most popular breed in Wisconsin
8. About the size of a football field
10. 99% of Wisconsin farms are this type of operation

**FUN FACES OF WISCONSIN AGRICULTURE**  
**WISCONSIN – THE DAIRY STATE-ANSWER KEY**



**Across**

- |  |                    |
|--|--------------------|
| 2. American's spend 10% of their disposable income on this   | <b>FOOD</b>        |
| 5. Wisconsin's ranking in milk production  | <b>SECOND</b>      |
| 6. Wisconsin ranks #1 in production  | <b>CHEESE</b>      |
| 7. Where dairy cattle may be shown by 4-H and FFA members  | <b>COUNTY FAIR</b> |
| 9. Agriculture is 12% of Wisconsin's   | <b>WORKFORCE</b>   |
| 11. There are over 1.2 million in Wisconsin  | <b>COWS</b>        |
| 12. Average number of days an American must work to earn enough money to pay for their food for one year | <b>FORTY</b>       |

**Down**

- |   |                         |
|---|-------------------------|
| 1. Held in October in Madison                         | <b>WORLD DAIRY EXPO</b> |
| 3. College major that focuses on the dairy industry   | <b>DAIRY SCIENCE</b>    |
| 4. Most popular breed in Wisconsin                    | <b>HOLSTEIN</b>         |
| 8. About the size of a football field                 | <b>ACRE</b>             |
| 10. 99% of Wisconsin farms are this type of operation | <b>FAMILY FARMS</b>     |