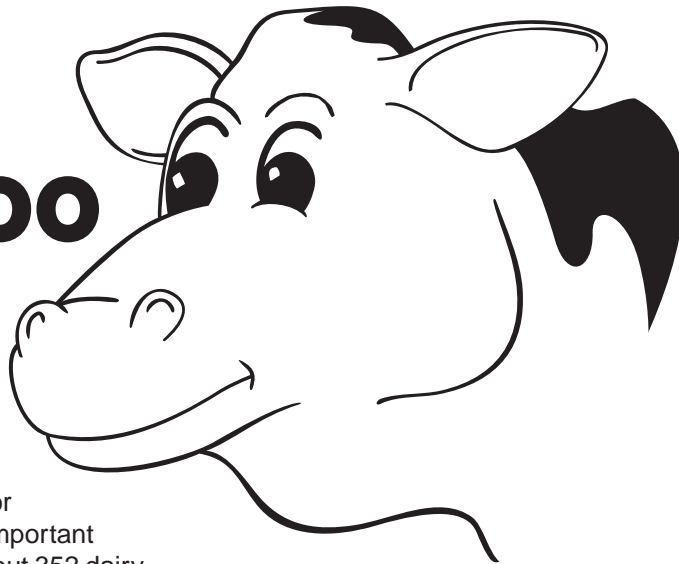


December 2005

A Magazine about Agriculture for North Dakota Students

Dairy: From Moo to You



Dairy Production

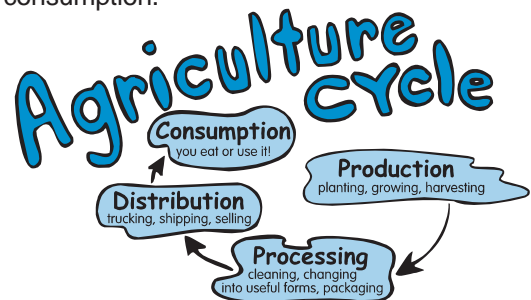
Even though North Dakota isn't a major dairy producing state, the industry is important to our economy. The state now has about 352 dairy farms with 33,000 cows. Annual milk production is about 522 million pounds.

Answers to Moo Math

1. $94 \text{ cups per day} \times 300 \text{ days}$
= 28,200 cups of milk in a year
2. $94 \text{ cups} \div 16 \text{ cups per gallon}$
= 5.875 gallons per day
3. $15 \text{ cows} \div 6 \text{ cows per hour}$
= 2.5 hours
4. $60 \text{ minutes in one hour} \div 5 \text{ minutes}$
= 12 5-minute increments in one hour
 $12 \text{ 5-minute increments} \times 6 \text{ cows per 5-minute increment}$
= 72 cows milked in one hour
5. $10,000,000 \times 0.90$
= 9,000,000 Holsteins in the U.S.

The Agriculture Cycle

Idea: Introduce this Ag Mag by talking about the Agriculture Cycle. Ask students to brainstorm dairy production, processing, distribution and consumption.



North Dakota
Agriculture
in the
Classroom



Dairy Production - continued

Idea: Mammals, Milk and Math – Developed by and used with permission from Susan Anderson, Education Specialist, Minnesota Agriculture in the Classroom

Activity Synopsis: Practice mathematical applications while learning about cows and milk.

Objective: The student will determine the number of half pints of milk a cow produces in a day and in a year.

Advanced Preparation: Download the Dairy Cattle commodity card at <http://www.mda.state.mn.us/maitc/commcard.htm>. Write out the number of gallons of milk in paragraph 6 on page 2 and duplicate a copy of page 2 for each student. *(Note: These cards are specific for Minnesota, most of the information is appropriate for North Dakota, too.)*

A set of empty containers – gallon, half-gallon, quart, pint, half-pint – for each group of students

Balance scales, if activity is age-appropriate, for converting to mass

Reproduce problem, which is stated at the end of this lesson, on a transparency

Blank transparency for recording responses

Liquid measuring cups

Water

Basin

Paper towels

Estimated Time: 45 minutes

Step 1:

Did you know that milk comes from cows? At milk break and in the lunchroom, you have milk every day. How many servings of milk are recommended? Why is it good to have milk every day?

What size containers are used for milk in the lunchroom? They are called half-pints.

Today in math we are going to find the solution to this problem: “About how many half-pints of milk does an average cow produce in one day and in one year?”

Refer to the problem, using the overhead transparency, to look at unknown vocabulary.

Are there any words that need to be discussed before we can begin to work on this assignment?

When the question starts with the word “about,” what does this mean?

We know what half-pints are since we see them every day, but do we know some of the equivalencies in cups, in quarts and in gallons that we might need to solve this problem?

What does “average” mean, and how would that be calculated for the amount of milk given by a cow?

Through our work, we are also going to fill in these missing pieces of data from the Dairy Cattle commodity card that is provided.

Step 2:

Divide the students into groups of four to six students. Give the following directions to the students.

In a group discussion, do the following:
(Allow 5 minutes for discussion)

Identify the information that is needed to solve the problem.

Choose someone from the group to record the information needed.

Step 3:

Bring the small groups together for reporting the information needed. Record the information needed to solve the problem on the blank transparency.

Step 4:

Read through the Dairy Cattle commodity card with the students. Indicate that the missing data on the card will be filled in when the problem is solved. We will know how

many half-pints of milk a cow can produce in a day and in a year.

Show the various containers, including gallons, half-gallons, quarts, pints and half-pints. Give each group a set of containers to use when solving the problem.

At this point, if balance scales are appropriate and/or available, they would be used to measure mass as the students convert pounds to cups or gallons.

If balance scales are not used, provide the students with the following information. One gallon of milk weighs 8.6 pounds. One gallon of water weighs 8 pounds. Why does milk weigh more?

Put the problem on the overhead projector.

Explain to the students that there is no one right way to solve the problem, but at the end of the period, they will be asked to share the process they used and what the approximate answers are for the missing pieces of data from the commodity card.

Step 5:

Students work on solving the problem.

Step 6:

Discuss the process each group used to solve the problem.

What made the problem difficult to solve?

What is your group's answer?

What steps did you use to solve the problem?

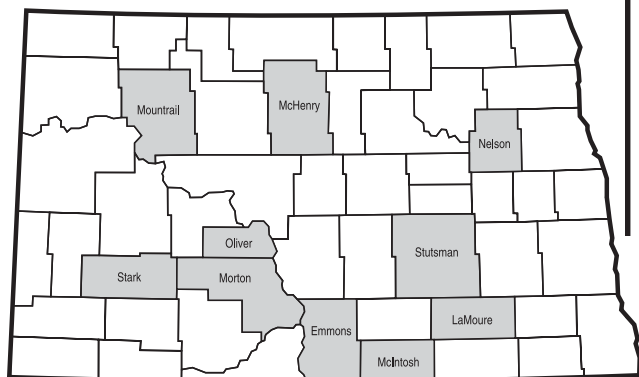
What were some interesting things that happened within your group as you worked to solve the problem?

What were some interesting facts you learned about dairy cows?

How many children can have a half-pint carton of milk at lunch thanks to one cow?

How many cows would it take to provide milk at lunch for the whole school?

Answers to North Dakota's Dairy Cows



Idea: Have students design their own Holstein patterns. Provide each student with a cow outline, and have them put their names on the back. Using black paint and a sponge or their thumb, have students create a Holstein pattern on the cow outline. Once the cow paintings are dry, have students examine their cows and look for distinguishing patterns, such as a tic-tac-toe board or Big Dipper. Have students think of a name for their cow based on the pattern they identify. Have them write the name of the cow on the back of the paper. Hang all the cows around the room and see if students can identify their own cow by using her name to remember her pattern.

From the *National Dairy Council*

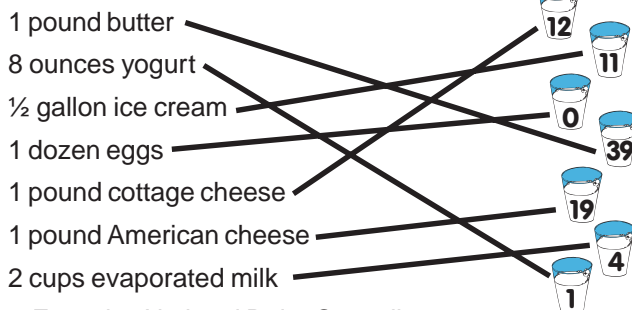
Career Corner

Idea: Brainstorm with students other careers related to the dairy industry, or have students list all the careers they can think of related to dairy production, processing, distribution and consumption. Each student could select and explore one career area.

Idea: Have students bring Nutrition Facts labels from dairy products, and review them together.

Dairy Processing

Answers to How Much Milk Does It Take?



From the *National Dairy Council*

Idea: Make a Polymer – The first plastics were made from natural sources such as milk, trees and plants. Plastics are made through a process called polymerization. In this process, molecules called monomers combine with each other to form larger molecules called polymers. These unique man-made polymer chains give plastics their special characteristics.

Materials:

- 1 cup milk
- 2 tablespoons white vinegar

Instructions:

Warm milk in a pan. Stir in vinegar. A white rubbery material forms. Take this out, wash it under the tap and shape it into objects such as marbles. Leave it for a few days, and the material will harden.

Discuss:

Explain to the students how the vinegar and milk react to coagulate casein. Protein molecules in the milk, which are so long they can bend, join to make the casein rubbery. As the material dries, the casein molecules shrink, making it hard.

Adapted from *Cycling Back to Nature with Biodegradable Polymers*, National 4-H Council

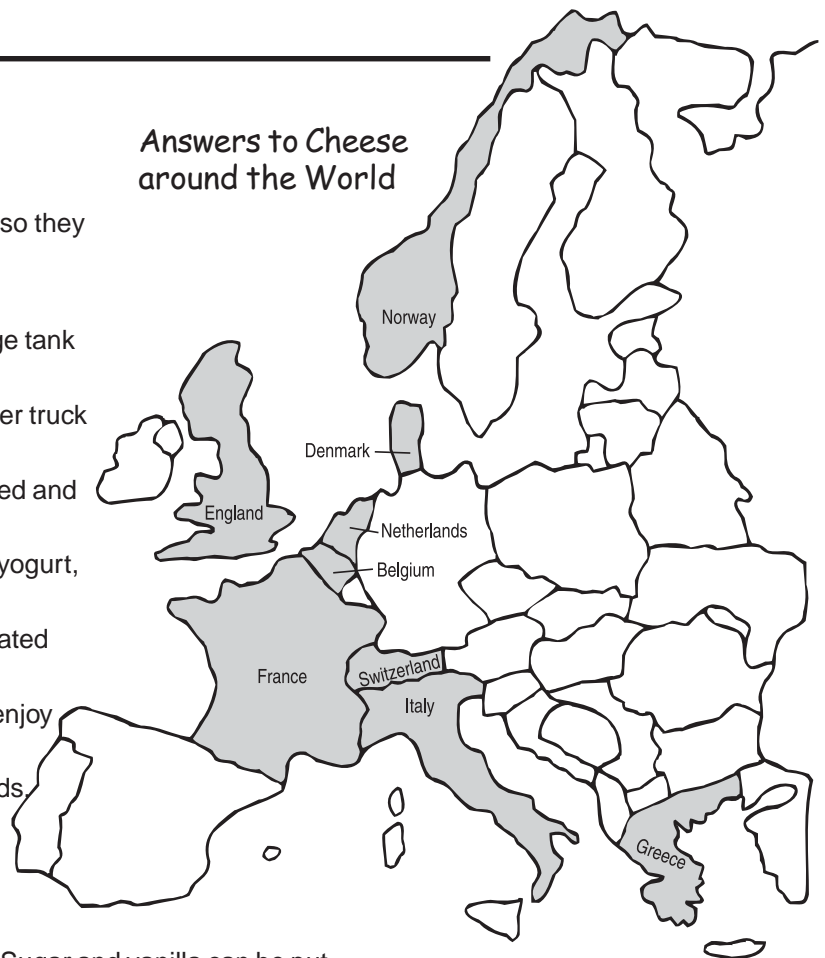
Idea: Study the science of milk and dairy processing by making curds and whey. See the directions at www.strausmilk.com under Kid and Adult Projects or at <http://schmidling.netfirms.com/making.htm>.

Dairy Distribution

Answers to The Journey of Milk

1. Cows eat nutritiously and drink lots of water so they can produce milk.
2. Cows are milked 2 or 3 times each day.
3. The milk is pumped into a refrigerated storage tank on the farm.
4. The milk is transported in a refrigerated tanker truck to the processing plant.
5. The milk is tested for quality and homogenized and pasteurized if it's to be sold as liquid milk.
6. Some of the milk is processed into cheese, yogurt, ice cream and other dairy products.
7. The dairy products are delivered with refrigerated trucks to stores, schools and restaurants.
8. You purchase dairy products at the store or enjoy them at school or at restaurants.
9. You enjoy the taste and nutrition of dairy foods.

Answers to Cheese around the World



Dairy Consumption

Idea: Check out Nutrition Explorations at www.nutritionexplorations.org for fun food games from the National Dairy Council and Kids Nutrition at www.ext.nodak.edu/food/kidsnutrition/ from the NDSU Extension Service.

Idea: Have students play the MyPyramid Blast-off game at the U.S. Department of Agriculture's www.MyPyramid.gov.

Idea: Squeeze Freeze

Supplies:

Liquid measuring cup
Measuring spoons
– tablespoon, ½ teaspoon
Paper towels

Needed for each child:

Small zip-lock plastic bag
Large zip-lock plastic bag
Plastic spoon
½ cup whole milk
1 tablespoon sugar
½ teaspoon vanilla
Ice, crushed or cubes
1 tablespoon salt

Setup: Sugar and vanilla can be put in small plastic bag ahead of time. Salt can be put in large plastic bag ahead of time.

Procedure: Give each child a small bag containing the sugar and vanilla. Have each child hold open the bag while an adult pours in the ½ cup whole milk. Remove as much air from the bag as possible. Seal bag. It is important bag is sealed properly.

Have the children drop the small bag into the large plastic bag with the salt in it. Add 18-20 ice cubes or crushed ice. Remove as much air as possible from the large bag. Seal properly.

Children should knead the bags about 10 minutes. When a soft ice cream is formed, give spoons to eat out of the bag.

Note: It is important to use whole milk. Other types of milk take too long to freeze. Salt is also very important. Without it, the ice cream will not freeze. One pint of half and half can be added to a gallon of whole milk. This makes the ice cream richer, and it will freeze faster.

Idea: Homemade Butter

Ingredients and Equipment:

½ cup whipping cream
Plastic jar or container
Salt
Crackers

Procedure:

Pour whipping cream into a clean plastic jar. Screw the lid on tightly. Shake the jar vigorously.

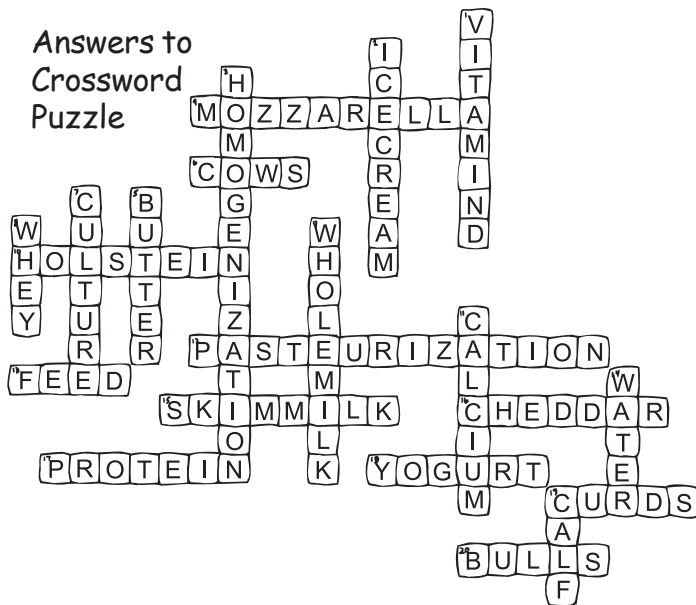
After about 10 minutes, yellow clumps will form as the butterfat particles stick together. The clumps will be surrounded by a white liquid. The liquid is sweet buttermilk.

Drain the liquid from the clumps. Rinse the clumps under cold water. Add a pinch of salt if you like. Serve on crackers.

From *Dairy Helper's Guide, 4-H Cooperative Curriculum System*

Idea: Have students compare the labels of butter and margarine. What are the differences? What are the similarities?

**Answers to
Crossword
Puzzle**



Dairy Reading Suggestions for Ages 6-10

A Picture Book of Cows by Dorothy Hinshaw Patent and William Munoz, Holiday House

Dairy Cows: A New True Book by Kathy Henderson, Chicago Children's Press

Extra Cheese, Please! Mozzarella's Journey from Cow to Pizza by Cris Peterson, Boyds Mills Press

Farm Animals by Angela Hart, Franklin Watts

Farming by Gail Gibbons, Holiday House

From Milk to Ice Cream by Ali Mitgutsch, Carolrhoda (unpublished)

Kowz and Co. by Nancy Gray, Liebl Printing Company

Morning Milking by Linda Morris, Picture Book Studio

The Generous Cow by Bijou LeTord, Parents Magazine Press

The Milk Makers by Gail Gibbons, Holiday House

Wholly Cow by Emily Margolin Gwathmey, Abbeville Press

Resources from the Midwest Dairy Council

Milk from Cow to You Education Kit

This educational kit teaches the important production and processing steps that protect the quality, safety and flavor of milk. The program is targeted to 3rd through 5th grade students. The teacher guide provides information on milk production along with hands-on classroom activities, tips for field trips and a list of resources. The kit also includes a 42 ½ x 33" colorful poster showing the route milk takes from farm to table. Thirty colorful interactive handouts are included for students.

- Order # 0962N Entire package \$15.25
- Order #0325N Poster only \$12.50
- Order # 0326N Handouts only .16 each

Dairy Days Tear pad

Test your dairy knowledge with this interactive page as you work your way through six activities.

- Order #0198M 100 sheets per pad. Free

To order these materials or to obtain a catalog of the Midwest Dairy Council's materials, call toll-free 1-877-487-5033 or e-mail dairycouncil@midwestdairy.com.

To contact your local dairy council representative, call 1-800-406-MILK (6455) or check www.midwestdairy.com.

North Dakota Dairy Princess Visits Classes

Kaylee Johnson is the 2005 North Dakota Dairy Princess and the daughter of Ole and Jessica Johnson of Center, N.D. Kaylee, her family and more than 400 Holsteins moved from the Yakima Valley in Washington to North Dakota in 2003, and they now operate Destiny Dairy.

Kaylee is available to come to schools to give an informative and inspiring presentation to elementary students on "Milk from Cow to You." She shows students the path milk takes from the farm to the table and talks about the care of dairy cows, how milk is transferred and hauled to the dairy plant, and the variety of delicious dairy foods. She stresses the importance of including 3 a Day of Dairy in the diet for good health.

If you're interested in having Kaylee come to your school, contact Char Heer of the Midwest Dairy Association at 701 782-4154 or cheer@midwestdairy.com.

North Dakota Agriculture in the Classroom Activities

This issue of the North Dakota Ag Mag focuses on North Dakota's dairy production, processing, distribution and consumption. The information and activities are geared primarily toward the state's third, fourth and fifth graders.

The Ag Mag is distributed three times per year. Subscriptions are free, but if you're not on the mailing list or if you know someone else, who wants to be added, contact the North Dakota Department of Agriculture at 1-800-242-7535 or ndda@state.nd.us.

The magazine is also on the Web at www.ag.ndsu.nodak.edu/aginfo/agmag/agmag.htm or through the North Dakota Agriculture in the Classroom Web site at www.ndaginclassroom.org.

This magazine is one of the N.D. Agriculture in the Classroom Council activities that helps you and other K-12 teachers integrate information and activities about North Dakota agriculture across your curriculum in science, math, language arts, social studies and other classes. It's a supplemental resource rather than a separate program.

The Council's mission is to cultivate an understanding of the interrelationship of agriculture, the environment and people by integrating agriculture into K-12 education.

The N.D. Agriculture in the Classroom Council is coordinated through the N.D. Department of Agriculture. For more information, contact:

Jeff Weispfenning, Joanne Beckman or Ken Junkert
1-800-242-7535
ndda@state.nd.us

Another Council teacher resource is **Project Food, Land & People** (FLP). Using the national FLP curriculum, N.D. Ag in the Classroom provides graduate-level credit workshops for teachers to instruct them in integrating objective, hands-on lessons that promote the development of critical thinking skills so students can better understand the interrelationships among the environment, agriculture and people of the world. Teachers are encouraged to adapt their lessons to include North Dakota products and resources.

Project Food, Land & People lessons include:

- Amazing Grazing
- Cows or Condos?
- By the Way
- Seed Surprises
- School ground Caretakers
- Could It Be Something They Ate?
- What Piece of the Pie?
- Piecing Together Population Patterns
- and many more.

For information about Project Food, Land & People classes, contact:

Gail Scherweit,
N.D. Farm Bureau Foundation
701 298-2219
gails@ndfb.com

Since teachers must relate work to **education standards**, the Council is working with North Dakota State University to identify which Project Food, Land & People lessons meet North Dakota's academic standards for grades 3–5.

For more information, contact:

Ken Junkert,
N.D. Department of Agriculture
701 328-4764
kjunkert@state.nd.us

The Ag in the Classroom Council, working with the N.D. FFA Foundation, offers **mini grants** of up to \$500 for use in programs that promote agricultural literacy. These mini grants will fund hands-on activities that develop and enrich understanding of agriculture and ag-related industries and the important role they play in North Dakota and society. Educators can let their imaginations be their guides as they design exciting projects to enhance ag education in or outside the classroom.

For information about mini grants, contact:

Beth Bakke Stenehjem,
N.D. FFA Foundation
701 224-8390
bethbakke@gcentral.com

The North Dakota Agriculture in the Classroom **Web site** at www.ndaginclassroom.org includes links to educational materials, statistics, resources, programs and more information that provide students with information about agriculture.

For more information, contact:

Ken Junkert, N.D. Department of Agriculture
701 328-4764
kjunkert@state.nd.us

Each issue of the **Ag Mag** focuses on an agricultural commodity or topic and includes fun activities, bold graphics, interesting information and challenging problems. Feedback and suggestions for future Ag Mag issues can be sent to:

Becky Koch, NDSU Agriculture Communication
701 231-7875
Becky.Koch@ndsu.edu

North Dakota Agriculture in the Classroom Council

Kim Alberty – Agassiz Seeds
Leland “Judge” Barth – N.D. Wheat Commission
Brenda Deckard – NDSU Dept. of Plant Sciences
Ginger Deitz – Bennett Elementary School, Fargo
Kay Fortier – N.D. CattleWomen
Gary Hoffman – N.D. Dairy Coalition
Kathy Holle – N.D. Career Development and Technical Preparation
Aggie Jennings – N.D. Farmers Union
Roger Johnson – N.D. Department of Agriculture
Ted Johnson – Kindred High School
Mary Lou Klemisch – Prairie View Elementary, New Salem
Theresa Orecchia – N.D. Corn Growers Association
Wayne Sanstead – N.D. Department of Public Instruction
Gail Scherweit – N.D. Farm Bureau
Doug Vannurden – N.D. Vocational and Technical Education
Jill Vigesaa – Project Food, Land & People

N.D. Department of Agriculture Staff Assisting
with Ag in the Classroom Council

Jeff Weispfenning, Joanne Beckman and Ken Junkert
N.D. Department of Agriculture
600 Boulevard Avenue, Dept. 602
Bismarck, ND 58505-0020
701 328-4758 or 1-800-242-7535
Fax: 701 328-1870/4567
ndda@state.nd.us

