

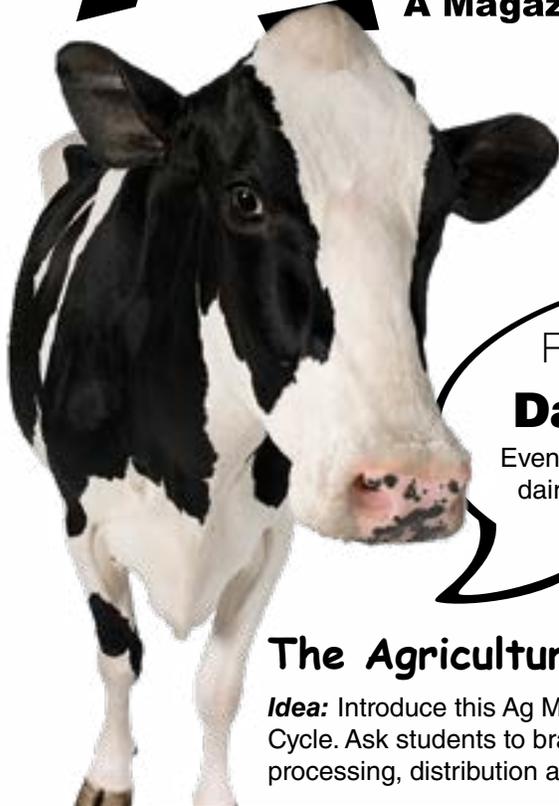
NORTH DAKOTA

Winter 2019-20



Ag Mag

A Magazine about Agriculture for North Dakota Students



Dairy

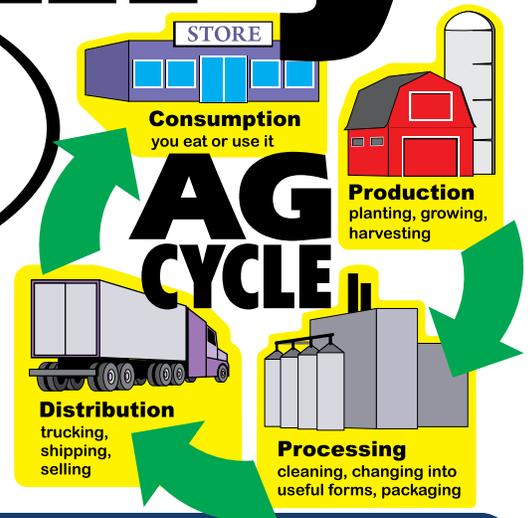
From Farm to You

Dairy Production

Even though North Dakota isn't a major dairy-producing state, the industry is important to our economy.

The Agriculture Cycle

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



Incredible Dairy Facts

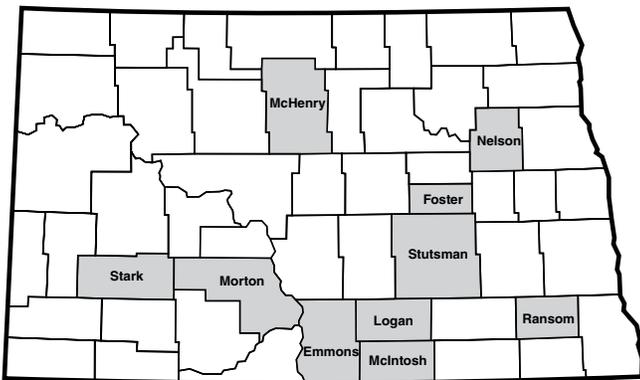
Use these words to fill in the blanks: **diet, pounds, trackers, fingerprint, hutches, birth, female**

1. Only female dairy cows produce milk. The males are called bulls.
2. A cow produces milk after she has given birth to a calf. She can have her first calf when she's about 2 years old.
3. Milk is measured in pounds, and the average U.S. cow produces about 70 pounds (128 cups or 8 gallons) of milk each day.
4. Holsteins are one breed of dairy cattle. A Holstein cow's spots are like a fingerprint. No two cows have exactly the same pattern of spots.
5. Some cows wear activity trackers to record how much they eat, sleep and milk.
6. Newborn calves usually live in hutches that keep them healthy by providing warm, dry bedding; protection from the weather; and fresh air.
7. Dairy cows eat a diet called a total mixed ration. This includes hay and grains plus vitamins and minerals so cows have all the nutrients to produce wholesome milk.

Answers to Moo Math

- 144 cups per day X 305 days
= 43,920 cups of milk in a year
- 144 cups ÷ 16 cups per gallon
= 9 gallons per day
- 15 cows ÷ 6 cows per hour
= 2.5 hours
- 60 minutes in one hour ÷ 5 minutes
= 12 5-minute increments in one hour
12 5-minute increments X 6 cows per
5-minute increment
= 72 cows milked in one hour
- 9,000,000 X 0.90
= 8,100,000 Holsteins in the U.S.

Answers to North Dakota's Dairy Cows

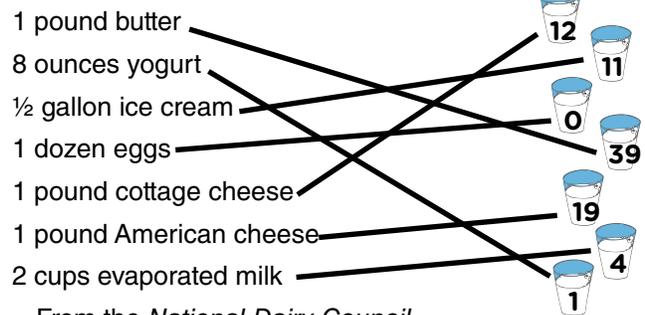


Idea: Have students design their own Holstein patterns. Provide each student with a cow outline, and have them put their names on the back. Using black paint and a sponge or their thumb, have students create a Holstein pattern on the cow outline. Once the cow paintings are dry, have students examine 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*

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 cottage cheese. See <http://ksagclassroom.org/education-center/lesson-plans/lets-make-cottage-cheese/>.

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.

Dairy Distribution

Answers to The Journey of Milk

1. First, cows eat a balanced and nutritious diet, drink lots of water and receive special care from their farmer-owners so they can produce milk.
2. Cows are housed in comfortable stalls and 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, at school or at a restaurant.
9. Finally, you enjoy the taste and nutrition of dairy foods.

Dairy Consumption

Idea: About 90% of all American dairy cows are Holsteins. However, six other breeds also are raised for milking in the U.S. Have students go to www.midwestdairy.com/education/farm-life/dairy-cows/ and write a descriptive paragraph explaining the difference between a Holstein and one of the other breeds.

Idea: Have students explore the dairy section and the games, activity sheets, videos and songs in the Kids section of www.ChooseMyPlate.gov.

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

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

Idea: Homemade Butter

Ingredients and Equipment:

½ cup whipping cream
Salt
Crackers
Plastic jar or container

Procedure:

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

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 also is 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.

Answers to Cheese around the World



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*

Undeniably Dairy

Circle the correct spelling of the words that describe the essential nutrients in dairy products and what they do for you.

Calcium or **Calsium** – helps build strong bones and teeth

Vitamin D – helps your body (adsorb or **absorb**) calcium to build strong bones and teeth

Phosphorus or **Fosforus** – strengthens bones and generates energy in cells

Pantothenic Acid – helps your body use (carbohidrates or **carbohydrates**), fats and protein for fuel

Protein or **Proteen** – builds and repairs muscles

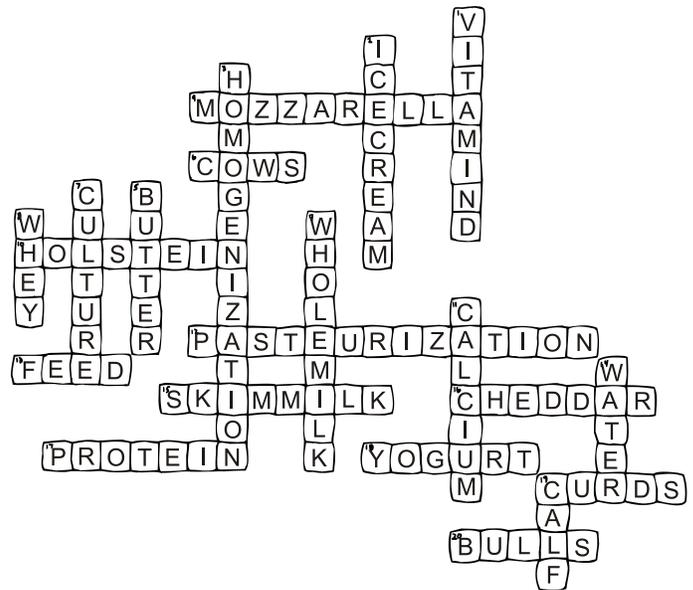
Riboflavin – helps change food to (**energy** or enerjy)

Vitamin B12 – builds red blood cells that carry (oxigen or **oxygen**) to body tissues

Vitamin A – helps maintain (vishon or **vision**) and skin

Niacin – helps digest sugars and fatty (**acids** or asids)

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

Teacher Resources

www.dairygood.org

Information about:

- Health and Wellness
- Sustainability
- Life on the Farm
- Facts and Myths
- Recipes

www.discoverdairy.com

Elementary lessons include:

- Makin' Cows Smile
- Keepin' It Fresh
- Goin' Round and Round
- Handin' It On
- Choosin' Keeps You Cruisin'
- Features computer-based games and classroom posters

www.discoverundeniablydairy.com

- Take a virtual field trip to a dairy farm
- Check out the Converting Poop to Power lesson and video
- Use the Creating My Plate lesson to create healthy meals and reduce food waste
- Teach the Our Perspective: From Farm to Table lesson about innovation and fermentation
- Jump into a dairy farm with 360 Video or a 360 Hot Spot

www.midwestdairy.com/education/school-programs/

- Discover Dairy curriculum includes STEM concepts while showing students where milk comes from and how dairy contributes to our world
- Discovery Education bring dairy's farm-to-table journey into your classroom with STEM curriculum, a virtual field trip and other virtual experiences

www.midwestdairy.com/education/farm-life/

- Learn about the dairy farmers who produce delicious milk and dairy products, take a tour of a working dairy farm or explore commonly asked questions about dairy nutrition and life on the farm

www.drink-milk.com

- Use the Healthy Bones Start with Dairy lesson at www.drink-milk.com/wp-content/uploads/2017/09/Healthy-Bones-Start-with-Dairy.pdf

Standards and Benchmarks

English Language Arts and Literacy Content Standards for Reading Informational/Nonfiction Text

- Gr. 3, RI.1 Ask and answer questions to demonstrate understanding of a text (textual evidence), referring explicitly to the text as the basis for the answers.
- Gr.3, RI.2 Determine the main idea of a text and recount the key details to explain how they support the main idea.
- Gr.3, RI.3 Describe the relationship between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text, using language that pertains to time, sequence, and cause/effect.
- Gr.4, RI.1 Refer to details and examples in a text (textual evidence) when explaining what the text says explicitly and when drawing inferences from the text. Summarize the text.
- Gr.4, RI.2 Determine the main idea of a text and explain how it is supported by key details.
- Gr.4, RI.3 Explain events, procedures, ideas, or concepts in a historical, scientific, or technical text, including what happened and why, based on specific information in the text.
- Gr.5, RI.1 Quote accurately using textual evidence when explaining what the text says explicitly and when drawing inferences from the text. Summarize the text.
- Gr.5, RI.2 Determine two or more main ideas of a text and explain how they are supported by key details.
- Gr.5, RI.3 Explain the relationships or interactions between two or more individuals, events, ideas, or concepts in a historical, scientific, or technical text based on specific information in the text.

Craft and Structure

- Gr.3, RI.4; Gr.4, RI.; Gr.5, RI.4 Determine the meaning of general academic and domain specific words and phrases in a text relevant to a grades 3,4 and 5 topics or subject areas.

North Dakota Mathematics Content Standards

Number and Operations in Base Ten

- 5.NBT.5 Fluently multiply multi-digit whole numbers using strategies flexibly, including the standard algorithm. Mastery of the standard multiplication algorithm is expected at this stage.
- 5.NBT.6 Using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division, find whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors

Measurement and Data

- 3.MD.2 Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l). Add, subtract, multiply, or divide to solve one-step word problems involving masses or volumes that are given in the same units.

Health Content Standards

Standard 1: GROWTH AND DEVELOPMENT

Body Systems

- 5.1.2 Explain the maintenance of human body systems (e.g., skeletal: choose foods high in calcium and vitamin D, be physically active)

Standard 6: CONSUMER HEALTH

- 4.6.1 Describe the characteristics of valid health information, products, and services (e.g. choose my plate.gov, USDA, FDA, nutrition labels, CDC)

Science Content Standards

From Molecules to Organisms: Structures and Processes

- Performance Standard 4-LS1-1 Construct an argument that plants, and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.

Matter and its Interactions (Standard for “Make a Polymer” activity in the Teacher’s Guide)

- Performance Standard 5-PS1-4 Conduct an investigation to determine whether the mixing of two or more substances results in new substances.

Social Studies Standards

Economic Standards: Exchange and Markets

- E.3_5.1 Utilize fundamental principles and concepts of economics to understand economic activity (e.g., needs and wants, goods and services, opportunity cost).
- E.3_5.2 Describe how goods and services are produced and distributed.
- E.3_5.4 Describe the necessity and impact of community services.
- E.3_5.5 Describe and analyze how North Dakota’s location, culture, and natural resources influence its economic decisions and development.

Geography Standards

- G.3_5.2 Use geographic tools and technologies to acquire, process, and report information from a spatial perspective.

North Dakota Agriculture in the Classroom Activities

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

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

Another council teacher resource is **Project Food, Land & People** (FLP). Using the national FLP curriculum and national Agriculture in the Classroom resources, N.D. Ag in the Classroom provides 600-level credit workshops for teachers to instruct them in integrating 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 has 55 lessons, including:

- Amazing Grazing
- Cows or Condos?
- Seed Surprises
- Schoolground Caretakers
- Could It Be Something They Ate?
- What Piece of the Pie?
- and many more.

For information, contact:

Jill Vigesaa
N.D. Farm Bureau Foundation
701-799-5488
jill.vigesaa@gmail.com

The N.D. Geographic Alliance conducts a two-day **Agricultural Tour for Teachers**. The tour includes farm and field visits, tours of agricultural processing plants to see what happens to products following the farm production cycle, and discussions with people involved in the global marketing of North Dakota farm products.

For information, contact:

Marilyn Weiser
North Dakota Geographic Alliance
701-858-3063
marilyn.weiser@gmail.com

Educators may apply for **mini-grants for up to \$500** for use in programs that promote K-12 agricultural literacy. Individuals or groups such as teachers, 4-H leaders, commodity groups and others interested in teaching young people about the importance of North Dakota agriculture may apply.

The proposed project must be targeted to young people 5-18 years of age and should enhance student knowledge of the contribution made by agriculture. Applications asking for funds for equipment or curriculum as well as those that involve innovative approaches to promoting agricultural literacy will be given preference. Examples of programs that may be funded: farm safety programs, purchase of agriculture curriculum, celebration of agriculture festivals, agricultural-based books for the local library, farm safety days, startup funds for a small greenhouse project, etc. Visit www.ndaginclassroom.org for ideas that can be used to support your project. Applications are due every year in early September.

For information, contact:

Thomas Winders, N.D. FFA Foundation
952-686-3643
twinders@ndffa.org

North Dakota Agriculture in the Classroom Council

Aaron Anderson – N.D. Dept. of Career and Technical Education

Nancy Jo Bateman – N.D. Beef Commission

Jackie Buckley – Youth Ag Education Representative

Kirk Olson – McKenzie County Farm Bureau

Nicole Wardner – NDSU Extension – Sheridan County

Statutory Member: Superintendent of Public Instruction

Kirsten Baesler (Bob Marthaller, representative)

N.D. Department of Agriculture Contact for Ag in the Classroom Council

Melanie Gaebe, Marketing and Information

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