



**TEACHER GUIDE**

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# TEACHER'S BACKGROUND INFORMATION

## Teacher Guide Contents

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## Milk from Cow to You Program Components

- Teacher Guide
- Poster
- Student Handouts

## Program Objectives

The **Milk from Cow to You** program has been designed to help students achieve several objectives including:

- Understanding the importance of dairy products in the diet
- Understanding the steps in producing/processing milk
- Describing the safeguards for keeping milk fresh and clean
- Recognizing interesting facts about cows

## Breeds of Cows

There are nearly 10 million milk cows in the U.S. today. About 90% of them are Holsteins. The major breeds are:

- Holsteins (black and white)
- Jerseys (yellowish-brown)
- Guernseys (tan and white)
- Brown Swiss (dark brown or gray)
- Ayrshire (white with reddish spots)

## Vital Statistics

Cows are large animals. The following statistics are given for the average Holstein:

Gender	Female
Height	5–5½ feet
Weight	1400 lbs
Body temperature	101.5°F
Weight of udder	25–60 lbs
Amount of milk held in the udder	25–50 lbs
Average herd size	50–75 cows

## Vo-Cow-Bulary

### Cud

Food swallowed by the cow but not chewed thoroughly until later

### Dry Off

Period when cow is not being milked

### Homogenize

To blend milk so that butterfat particles are evenly distributed throughout

### Let Down

Condition when cow is ready to be milked because the teats are filled with milk

### Pasteurize

To heat milk to a high temperature for a short time to protect its purity

### Silage

A chopped mixture of green corn, grass, and legumes stored in a silo

### Teat

One of the 4 nipples on the cow's udder where milk comes out

### Udder

Part of the cow where milk is stored

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## Bovine Eating Habits

Cows are big eaters. Each day, they eat approximately:

- 40 lbs. feed and hay
- 50 lbs. silage
- 25–50 gallons water—nearly a bathtub full!

Ninety pounds of food equals 480 hamburgers. In comparison, the average American eats only about 4 pounds of food a day.

## A 4-Part Stomach

Cows have a unique digestive system:

- Cows swallow food quickly without chewing it well.
- The food goes into the first and second stomachs—the rumen and the reticulum.
- When the cow has eaten her fill, she burps up a small amount of food—cud—to chew again.
- After chewing her cud thoroughly, she swallows it and it goes into the 3rd stomach—the omasum.
- From there it moves on to the 4th stomach—the abomasum—where digestion actually occurs.
- Cows spend about 6½ hours a day eating.
- A cow's body uses part of the food to grow and stay healthy. Her body uses another part of the food to make milk in the udder.
- It takes the cow's body about 2 days to process her food into milk.

## Cows as Milk Producers

Cows have been called nature's own milk factory on four hooves.

- All cows are females. Like humans, they cannot produce milk until they give birth.
- Cows usually have their first calf when they are 2 years old. The gestation time for a calf is 9 months. 95–97% of the pregnancies result in one calf.
- Cows are usually milked for 305 days (10 months) after giving birth.
- Then they are allowed to “dry off” for about 2 months until their next calf is born.
- To dry off a cow, the farmer stops milking her. This gives her body the cue to stop producing more milk.
- Most cows are milked for about 7 years.

Each well-fed cow produces an average of about:

- 25 pounds (45 cups) of milk in one milking.
- 50 pounds (90 cups) of milk per day.
- 15,000 pounds (28,000 cups) of milk in a year.
- 107,000 pounds (200,000 cups) of milk in a lifetime. That's enough to fill the average classroom 2 feet deep with milk.

If a cow eats only grass, it produces only about 13.3 pounds (24 cups) of milk in one milking. So you can see, good nutrition pays off for cows as well as people!

## Milking Cows

Cows respond best to patient, kind handling and regular, routine procedures. They are milked 2 or 3 times a day.

First, the cow's udder and teats are washed before she is milked. This is done to:

- Keep the milk clean.
- Send a signal to her brain to “let down” the milk.

Then a milking machine is attached to the cow's 4 teats.

- The milking machine doesn't hurt the cow.
- The vacuum of the milking machine gently squeezes out the milk—similar to the action of a sucking calf or a baby sucking his thumb.
- It takes about 5 minutes to milk a cow.
- On many farms, computers keep track of how much milk a cow produces at each milking.
- The first milking machine was patented in 1894. With milking machines farmers can milk about 100 cows an hour.
- Before then, cows were milked by hand. A farmer could milk about 6 cows an hour by hand.
- If a cow misses a milking, the milk builds up in her udder. She will have lots of milk in her next milking and might even begin to leak.

## Storing Milk

Once outside the cow, milk is never exposed to air because it has no protection from contaminants. That is why clean equipment and sanitation are so important.

### Pump It

- Sanitized pipelines carry milk straight from the cow and milking machine to the cooler.
- Milk is never touched by human hands.

### Cool It

- Milk comes out of the cow warm—at the cow's body temperature.
- It is quickly cooled in refrigerated storage tanks to 45°F or lower to keep it fresh and good tasting.
- Milk is stored in the refrigerated tank until the tank truck comes.
- Tank trucks come every day or two to pick up the milk.
- Milk is pumped into the insulated tank truck—which is like a giant Thermos® bottle on wheels.
- The tank truck keeps milk fresh and cold on its way to the dairy processing plant.

## At the Processing Plant

Milk samples are first tested in a lab to ensure that only the purest milk is used. Milk that isn't top quality or that hasn't been kept cold enough is not processed for people to drink.

### Homogenize

- The milk is then homogenized to break the butterfat particles into tiny, uniform globules.
- Homogenizing ensures that the butterfat particles are uniformly distributed throughout the milk.
- If milk wasn't homogenized, the cream would rise to the top. So you would have to shake or stir the milk before serving.

### Pasteurize

- In 1856, Louis Pasteur, a French scientist, discovered that heating liquids to high temperatures kills bacteria.
- Today, milk is pasteurized by quickly heating it to 161°F for 15 seconds and then rapidly cooling it.
- Pasteurization protects the purity and flavor of milk without affecting its nutrient value.

Milk is made into a variety of products, including:

- White and chocolate milk
- Buttermilk
- Cheese
- Cottage cheese
- Yogurt
- Ice cream and frozen yogurt
- Butter
- Cream, sour cream, and whipped cream

## At the Grocery

It takes about 2 days from the time milk leaves the cow until the time it reaches the grocery store. At the grocery, milk is kept refrigerated at 40°F or lower.

## Handling Milk at Home

Consumers can help keep milk pure and safe by following the 3 C's:

Keep milk **clean**

Keep milk **covered**

Keep milk **cold**

- Store milk in its own container or in a clean pitcher. Do not touch the pouring lip of the container.
- Keep the milk container covered or resealed when done pouring. Milk quickly picks up flavors of other foods in the refrigerator.
- Because milk is perishable, it must be refrigerated at 40°F or colder. Store milk in the coldest part of your refrigerator.

## What Milk Does for You

One delicious cup of ice cold milk provides:

%  
Daily  
Value

- 30% calcium**  
*for strong bones and teeth*
- 24% riboflavin**  
*for healthy skin*
- 16% protein**  
*to build strong muscles*
- 10% vitamin A**  
*for night vision*

Students age 6 to 10 need at least 3 servings from the Milk Group each day to get the nutrients they need.

# ACTIVITY PLAN

## OUTCOMES

Students will be able to:

- Explain the importance of milk in a nutritious diet
- State the steps in producing/processing milk from the cow to the home
- Describe the safeguards for keeping milk clean and fresh
- Describe several characteristics of cows

## ADVANCE PREPARATION

- Review pages 3–4 to familiarize yourself with the milk production process.

## SUGGESTED INSTRUCTIONAL STRATEGIES

### Setting the Stage

Arouse students' interest in the topic with a technique such as:

- Passing around several milk containers. Have students examine the cartons and identify any unfamiliar words. Write the words on the board.
- Conducting a brainstorm listing all the information students know about milk and/or cows.
- Posing a riddle. For example: "I am 5' tall and weigh 1400 pounds. I eat 90 pounds of food and drink a bathtub full of water each day. What am I?"
- Asking a series of questions including:
  - What is a dairy food?  
(A food made from milk)
  - What dairy foods do you eat regularly?
  - What dairy food is your favorite?
- Preteaching any unfamiliar vocabulary on the poster and/or student handout.

### Using the Mini Poster

Discuss the poster, one section at a time. Use one or more of the following ideas during your presentation:

- Supplement the information on the poster with information from pages 2–4 that you feel is appropriate for your students.
- Distribute the mini poster handout. Have students focus on the side with four pictures. For each picture on the mini poster, have students read the corresponding information.

- Have the class brainstorm additional questions that come to mind as they study the mini poster, e.g.:
  - What are those round buildings behind the barn?
  - How many cows do most farmers have?
  - How much milk does a cow make each day?Provide resources for students to research their questions. Have students report findings to the class.
- List some of the interesting cow facts from pages 2–4. Work with students to come up with real-life examples to make these abstract concepts more concrete. For example:
  - A cow weighs 1400 pounds. That's equal to 28 children who weigh 50 pounds each.
  - A cow spends 6½ hours a day eating. That's the same length of time as a school day.
  - It takes 2 days for the cow's body to turn feed into milk. It takes another 2 days for the milk to get from the cow to the grocery. Grass that is eaten on Friday becomes milk by Sunday and is in a carton in the grocery store by Tuesday.
- Have students identify each point in milk production when special effort is made to keep the product cool and/or pure.
- After discussing the mini poster, help the class summarize the "big idea" of each picture.
- Duplicate and send home a copy of the *Parent Letter* on page 11 with each student.

## Using the Student Handout

The student handout is designed for grades 3–5. It can also be modified to work with younger students.

## Back (Quizzes and Cow Facts)

- Use props to illustrate some of the “Incredible Cow Facts” (e.g.) Bring in something that weighs 25 pounds to show how much milk is in a full udder.
- Make the “Orange Cow” recipe in class. Or, have students make it at home and report back on how they liked it.
- Use the information on page 3 and the diagram of the cow on the student handout to explain the process of digestion in cows.
- Use cups (or clean ½ pint milk cartons) to illustrate the number of cups of milk needed to make each product listed in “How Much Milk Does It Take?”
- List all the foods students name in the “Are You Calcium Smart?” Quiz. Have students bring in food packages with nutrition labels for the foods they named. Check to see if milk or cheese is one of the top 3 ingredients. Also check to see if there is 10% or more calcium in each serving.

## GOING FURTHER

### Tasting Party

Hold a tasting party of dairy foods. Select 3 variations of the same product—white milk, chocolate milk, and strawberry milk. Or, select 3 different products. Try to select at least one or two unfamiliar products among the three.

#### NOTES:

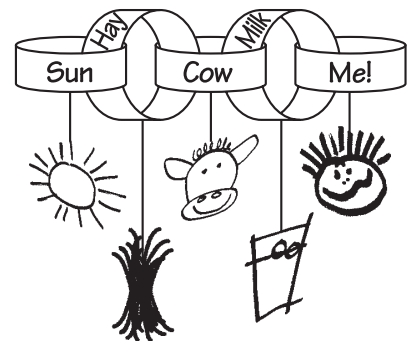
- Make sure to serve the milk ice cold for best acceptance by students.
- You may be able to get foods donated from your school food service or from parents.
- Remember, all students need is a taste—1–2 oz of fluid milk; ½–1 oz cheese; 1–2 T of yogurt.
- If you do not have access to a refrigerator, most dairy products can be stored for several hours in an ice chest with ice.

### Milk Containers Math

Collect empty milk cartons and jugs in a variety of sizes. Fill some of the containers with water. Have students transfer the liquid to other milk containers to determine how many pints are in a quart, quarts in a half gallon, etc.

## Milk Cow-Paign Poster

Have students create posters for the school cafeteria using information learned in this unit. The posters should encourage other students to drink milk or eat other dairy products.



## Food Chain Chain

Have students make a food chain chain representing the information in the *Milk from Cow to You* poster. Cut paper strips from heavy paper to make links in the chain. Each paper loop should be labeled to represent a step in the food chain. You may also want students to hang pictures from each loop.

## Holstein Patterns

No two Holsteins have the same pattern of spots—just as no two people have the same fingerprints. Have your class create their own unique Holsteins.

Distribute the *Cow Outline* (page 8). Have students 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.

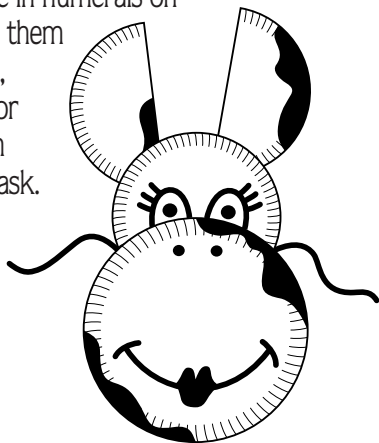
Once the cow paintings are dry, have students examine their cow and look for a distinguishing pattern such as a “Tic-Tac-Toe” or “Big Dipper” pattern.

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.

## Moo Masks

Have students create cow masks with 1 large dinner-size paper plate and 2 small dessert plates (1 cut in half). Have them staple or glue the plates together, as shown. Cut holes for the eyes. Then suggest students add a mouth, nostrils, spots, etc. Also, have students add an ear tag, putting their own birthdate in numerals on the tag. Have them attach ribbon, string, yarn, or elastic to each side of the mask.



## From Moo to You

Distribute copies of the *From Moo to You* worksheet on page 10. Review the instructions with students. Let students start by coloring in any dairy foods they’ve eaten today. Suggest that they explain the handout to their parents and then post it on the refrigerator or in some easy-to-see spot at home.

If you haven’t already sent the *Parent Letter* on page 11, you might want to send it home with this handout.

### Rock-and-Roll Butter

½ cup whipping cream  
salt (optional)

Pour room temperature whipping cream into a clean plastic jar. Screw on the lid tightly. Have students take turns shaking the jar vigorously. (You may want to turn on some lively music for inspiration.)

After about 10 minutes, yellow clumps will form as the butterfat particles stick together. Pour off the liquid (buttermilk). Rinse the butter with cold water. Add a little salt, if you like. Serve on crackers.

## Where We Drink Milk

Review the places people can drink milk depicted on the *Milk from Cow to You* poster. Have students brainstorm other places they can drink milk: airplanes, picnics, cars, etc.

Have children draw pictures of themselves drinking milk in their favorite place and write a sentence describing the place.

Pictures can be assembled in a class book or posted on a bulletin board with pictures of milk and other dairy foods.

## Milk Mix-Up

Distribute the *Milk Mix-Up* worksheet (page 9) depicting several steps in the production of milk—all out of sequence. Depending on their age level, students might do one or more of the following:

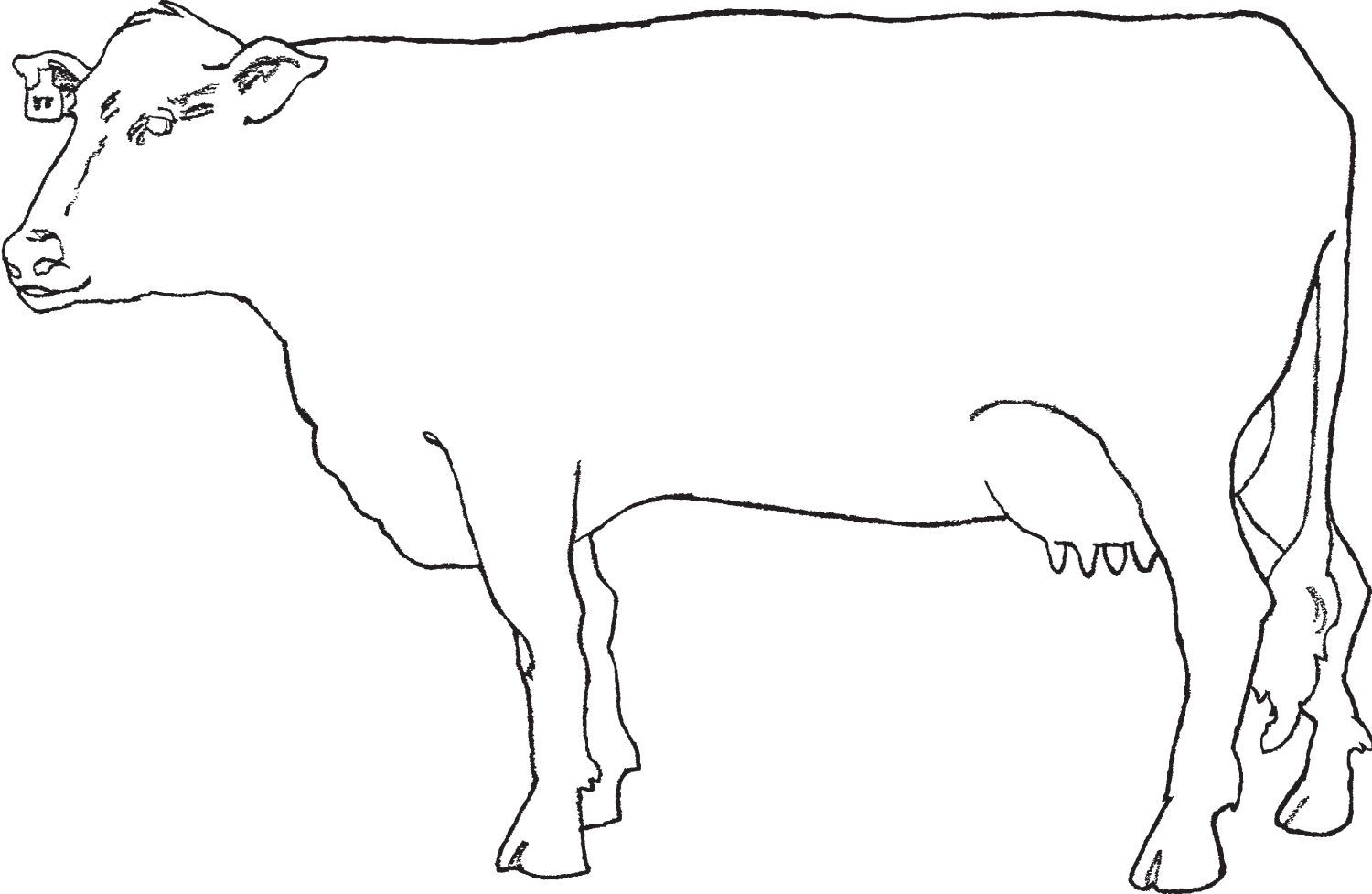
- Color the pictures
- Cut out the pictures and paste them down in the correct sequence on a sheet of paper or in a mini-book
- Number the pictures in sequence
- Create a flow chart to show the sequence of milk production
- Write a sentence under each picture to describe that particular step in milk production

## Dairy Case Magic

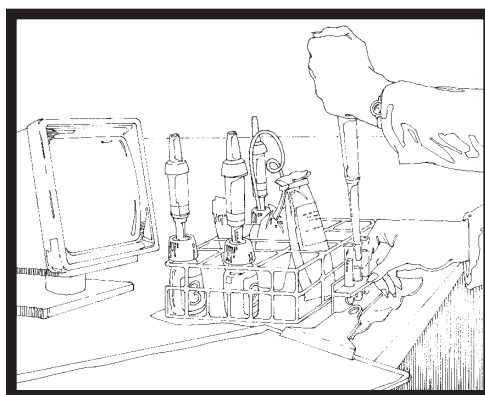
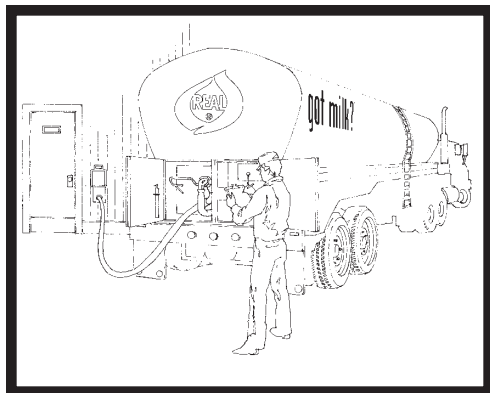
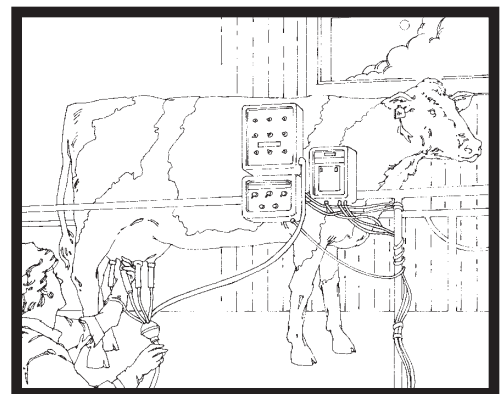
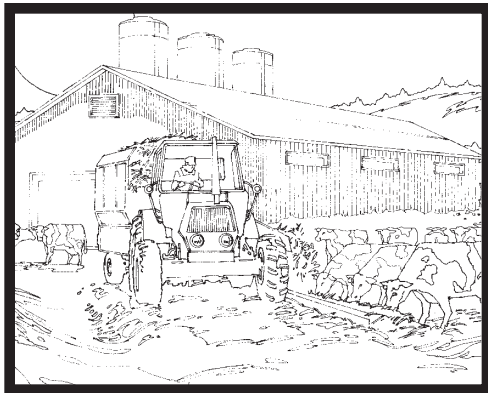
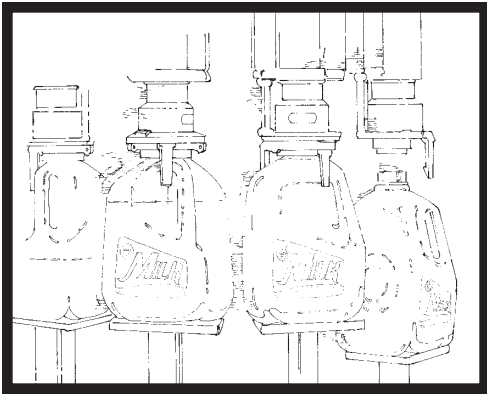
Have students do research to find out how various dairy products are made. Possible products to investigate include chocolate milk, cheese, yogurt, and ice cream.

# COW OUTLINE

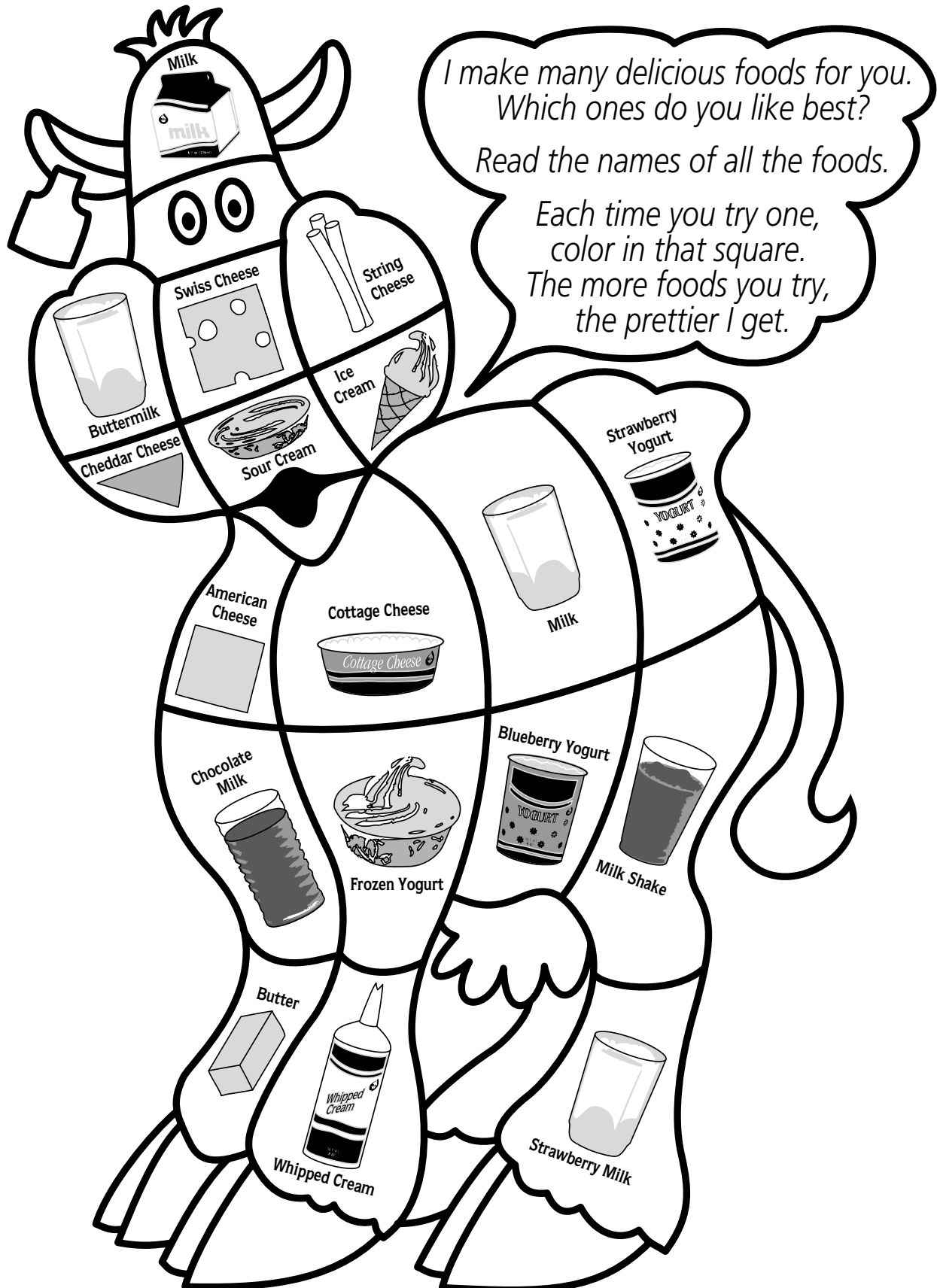
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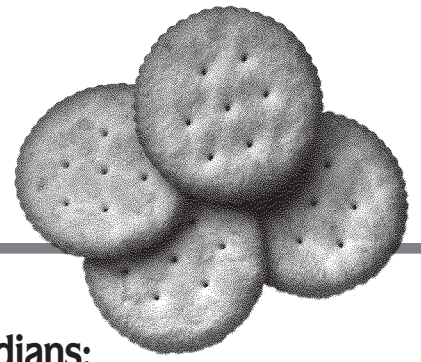


# MILK FROM COW MIX-UP



# FROM MOO TO YOU





## Dear Parents/Guardians:

*Your child has been studying about how milk gets from the cow to your home. We've emphasized the care taken to make sure milk is always safe and fresh tasting.*

*Nutrition experts suggest that children ages 6 to 10 need 3 servings of Milk Group foods each day to get enough calcium. Milk, cheese, and yogurt are excellent sources of calcium.*

*School age children are forming food preferences they will carry into adulthood. Now is the time to encourage them to try new foods—particularly nutritious foods. Listed below are 12 easy and inexpensive ways to serve Milk Group foods with "kid appeal."*

*Support your child in becoming a food taster. Have a variety of Milk Group foods available in your home for your child to taste. In fact, try one of the ideas below...today!*

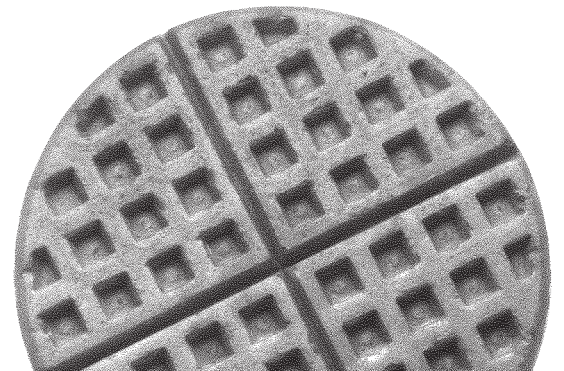
*Thank you very much, and good eating to you!*

*Sincerely,*

### A Dairy Dozen

- Fresh fruit and yogurt
- Chocolate milk
- Cheese and crackers
- Cereal and nuts mixed with yogurt
- Grilled cheese sandwich
- Toaster waffle topped with frozen yogurt
- Instant pudding made with milk
- String cheese
- Fresh vegetables and dip
- made of:
  - 1 cup sour cream
  - 1 cup plain yogurt
  - 1 package dry ranch salad dressing
- Strawberry-flavored milk
- Melted cheese on a bagel or tortilla
- A crunchy apple and a glass of ice cold milk

**Quick, Easy, Economical!!**



## ADDITIONAL TEACHER RESOURCES

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### Books for Teachers and Other Leaders

*About Cows*  
by Sara Rath  
Minocqua, WI: Heartland Press, 1987

*Ice Cream*  
by William Jaspersohn  
New York: Macmillan Publishing Company, 1988

### Books for Intermediate Grades

*The Amazing Milk Book*  
by Catherine Ross and Susan Wallace  
Reading, MA: Addison-Wesley Publishing Company, Inc., 1991

*Mammals and Their Milk*  
by Lucia Anderson  
New York: Dodd, Mead and Company, 1985

*Milk*  
by Dorothy Turner  
Minneapolis: Carolrhoda Books, 1989

### Books for Primary Grades

*Extra Cheese, Please!*  
by Cris Peterson  
Honesdale, PA: Boyds Mills Press, 1994

*What's It Like to be a Dairy Farmer?*  
by Susan Poskanzer  
Mahwah, NJ: Troll Associates, 1989

*Milk From Cow To Carton*  
by Aliko  
New York: Harper Collins Publishers, 1992

*No Milk!*  
by Jennifer Ericsson  
New York: Tambourine Books, 1993

*The Milk Makers*  
by Gail Gibbons  
New York: Macmillan Publishing Company, 1985

*Ice Cream*  
by Stella Keller  
Milwaukee: Raintree Publisher, 1989

*Make Mine Ice Cream*  
by Melvin Berger  
New York: Newbridge Comms, 1992

*Milk*  
by Donald Carriek  
New York: Greenwillow Books, 1985

*Calf See How They Grow*  
by Mary Ling  
New York: Darling Kindersley, Inc., 1993

### Other Programs from DAIRY COUNCIL®

#### EAT THE FIVE FOOD GROUP WAY!®

This colorful interactive handout, and engaging teacher guide help children learn key nutrition concepts. Your students will research, act, and play word games as they learn about the food groups.

#### FOOD MODELS

Bring nutrition to life with these life-size, full-color cardboard photographs of 185 foods. Students love the mouth-watering photos. And teachers can use them again and again in dozens of teaching situations.

To obtain any of these materials listed above, contact your local Dairy Council or call **1-800-426-8271** for the Dairy Council nearest you.

#### NUTRITIONEXPLORATIONS.ORG

For additional materials and resources for teaching nutrition, visit **[www.NutritionExplorations.org](http://www.NutritionExplorations.org)**.