

COUNTRY

to

Classroom



**Dairy
Products...**

...from
MOOO
to You!



Milk Processing

At the Dairy

the milk is cooled to 45°F or lower and stored in large refrigerated tanks. An insulated tank truck --which is like a giant thermos bottle on wheels -- picks up the milk and transports it to the processing plant. At the processing plant the milk is pumped into a **pasteurizer**. Here it is heated to 161° for 15 seconds and then cooled to 35°F. This pasteurization process kills any harmful bacteria that might be in the raw milk and helps keep the milk fresh. In 1856, Louis Pasteur, a French scientist, discovered that heating liquids to high temperatures kills bacteria.

A machine called a separator spins the milk so fast the milk and cream are separated. Computerized equipment is used to mix the milk and cream back together. This is how dairy processors make fat-free, lowfat, reduced fat and whole milk. The milk is then **homogenized** to break

the butterfat particles into tiny, uniform globules.

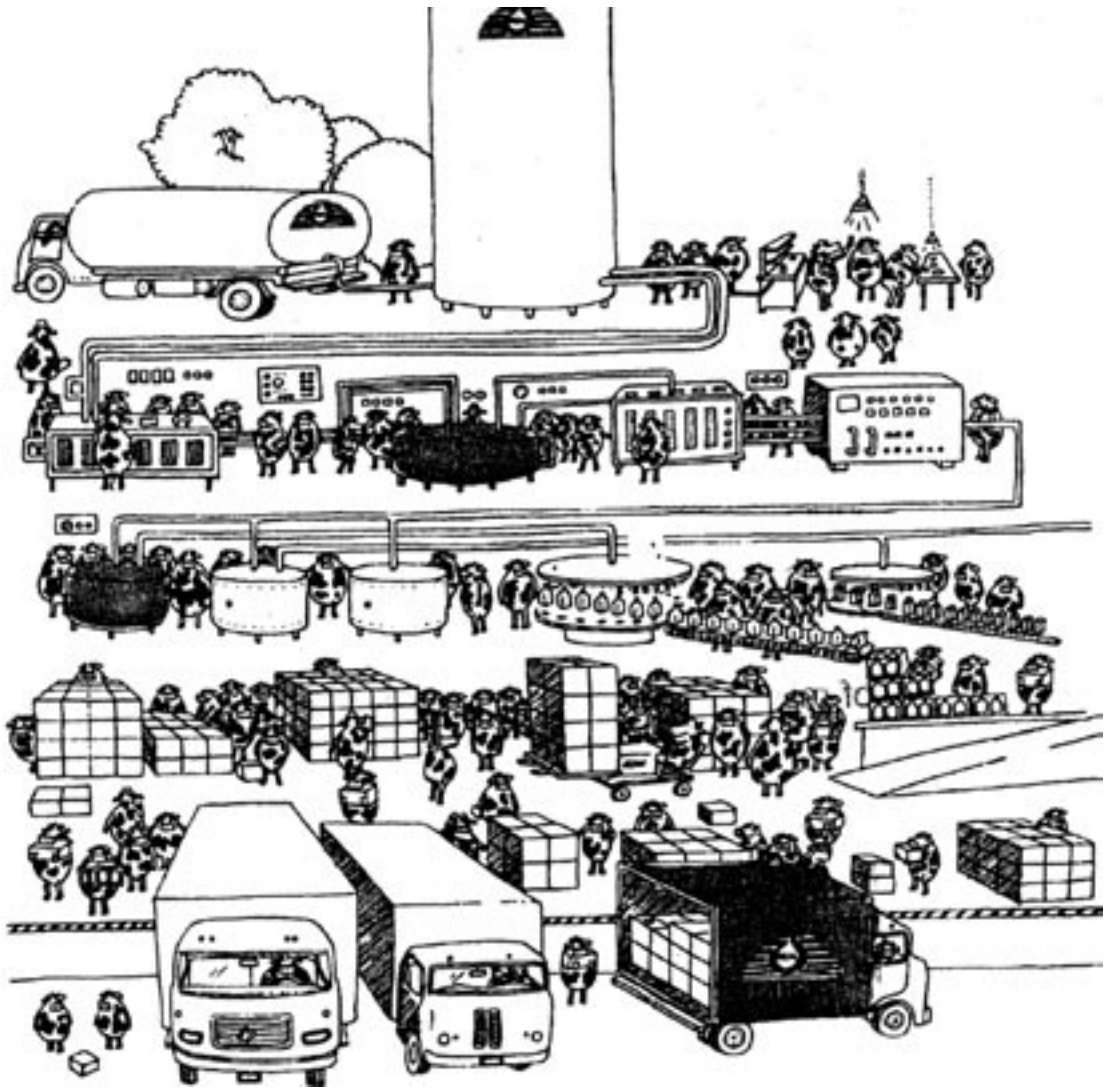
Homogenizing ensures that the butterfat particles are uniformly distributed throughout the milk. If milk wasn't homogenized, the cream would rise to the top. So you would have to shake or stir the milk before serving.

From the time the milk reaches the dairy processing plant until it leaves as a finished product, it is tested many times in the plant's laboratory. These tests make sure the dairy products are safe to eat and drink.

The milk will be made into different dairy products such as chocolate milk, buttermilk, cottage cheese, cheese, sour cream, butter, whipping cream, yogurt, ice cream and the milk you drink everyday.

Filler machines pump milk into cartons and jugs. These cartons are then packed into cases and boxes and kept in a large warehouse, which is colder than your refrigerator at home, until they are ready for delivery. Refrigerated delivery trucks take the dairy products to grocery stores, restaurants, hospitals, homes, schools and other places where dairy products are sold.

That is how milk makes its way from the dairy cow to you. This process is completely clean and sanitary. Not once during this process do human hands touch the milk.



Vo-COW-Bulazzy

Cud: Food swallowed by the cow but not chewed through 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

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

Udder: Part of the cow where milk is stored

The Milk Story



Much of the milk

you drink and the dairy products you eat come from 80 Wyoming dairy farms. There are about 6,000 dairy cows living in our state. Most of these cows are from a breed of cows called Holstein. Holsteins are black and white cows. Other breeds of dairy cows include Guernsey, Jersey and Brown Swiss.

A dairy cow is milked at least twice a day for nine or ten months each year. A cow may produce 8 to 10 gallons of milk each day. Today's modern dairy farms use computers to record exactly how much milk each cow produces, how much she is fed, and keeps tracks of her health records.

High speed milking machines help the dairy farmer milk more than 100 cows per hour. The milk goes directly from the cow into the milking machine then into storage tanks. These storage tanks keep the milk cold.

Dairy cows can eat up to 100 pounds of food and drink between 25 and 50 gallons of water each day -- nearly a bathtub full.



MILK FROM COW TO YOU

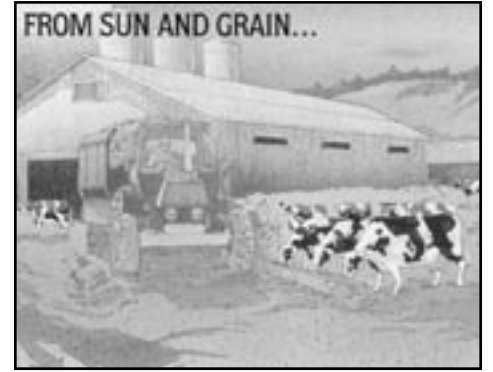


1. More than 72 percent of the calcium in the United States' food supply comes from dairy products.
2. One gallon of milk weighs 8.6 pounds.
3. There are approximately 6000 dairy cows in Wyoming.
4. More ice cream is consumed on Sunday than any other day of the week. Vanilla is the most popular flavor. Chocolate is second.
5. Of all Wyoming agriculture, dairying is the tenth largest contributor. In 1998 total cash receipts of Wyoming dairy products exceeded \$10.7 million.
6. The Latin word for cow is bos.
 - which is why so many cows are called bossy
7. Holstein spots are like fingerprints - no two cows have the same spot pattern.
8. Wyoming dairy cows produce

Milk comes from healthy well-fed cows

Did you know:

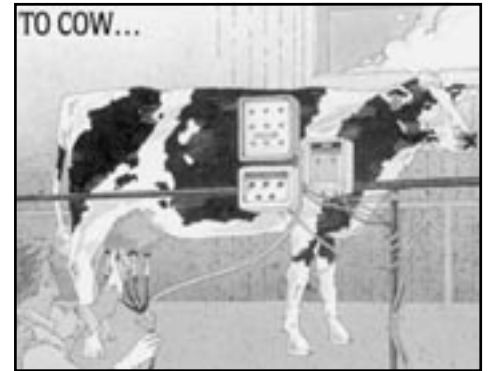
- Cows eat about 90 pounds of nutritious food a day. 90 pounds of food equals:
 - 480 hamburgers or
 - 206 baked potatoes or
 - 1440 slices of bread
- Cows drink 25-50 gallons of water each day. That's nearly a bathtub full!



Milk is collected and cooled in the milking parlor

Did you know:

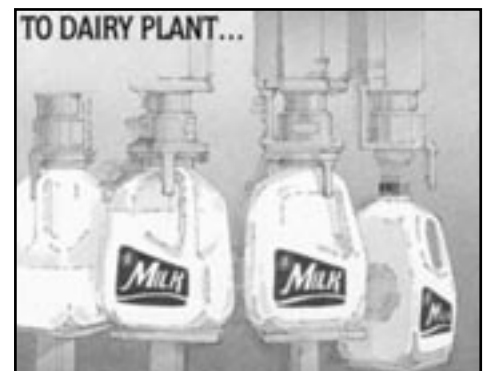
- What a cow eats affects how much milk she makes.
- A cow that eats only grass can make about 50 glasses of milk a day.
- A cow that eats grass, corn, hay and mixed feed can make about 100 glasses of milk a day.
- Modern milking machines can milk about 100 cows an hour. If you milked cows by hand, you could milk about 6 cows an hour.



Milk is processed in the dairy plant

Did you know:

- Milk is one of the safest foods you can eat. In the dairy plant it is never touched by human hands. So it stays very pure and fresh-tasting.
- In 1884, dairy plants started using glass bottles to store milk. Before that time they used jars, pails and cans.
- In 1906, the first paper milk carton was used.
- In 1964, plastic milk jugs were introduced.



Milk is delivered to many places

Did you know:

- Long ago, when people traveled and wanted milk, they had to take cows with them.
- When Pilgrims came to America, they brought cows with them.
- Nowadays, milk is delivered to stores, schools, and even to homes. The milk delivered today was in a cow two days ago.



Milking Cows

Cows respond best to kind handling and regular, routine procedures. They are milked two or three times a day.

First, the cow's udders 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 four 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 milking machines, 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.

Vital Statistics

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

- **Gender:** Female
- **Height:** 5- 5 1/2 feet
- **Weight:** 1400 pounds
- **Body temperature:** 101.5° F
- **Weight of udder:** 25-60 pounds
- **Amount of milk held in the udder:** 25-50 pounds

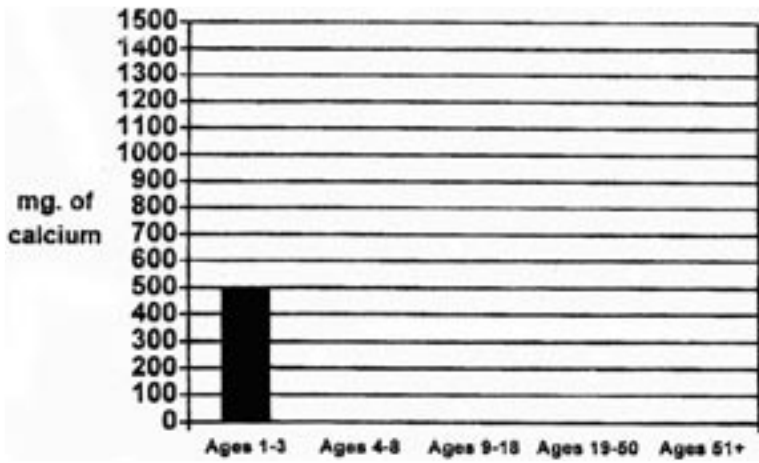


Feed Your Bones!

How Much Calcium Do We Need?

Everyone needs calcium. Calcium, along with vitamin D and exercise, helps make bones stronger. If you did not have calcium in your bones they would be soft enough to tie into knots. Babies and children need calcium for growing bones and teeth. Adults need calcium to maintain bone strength.

You never outgrow your need for milk. This is how much calcium we need at various life stages. Use this chart to complete the graph at the left. The first one is done for you.



Age	Mg/Day
1 - 3	500
4 - 8	800
9 - 18	1,300
19 - 50	1,000
51 +	1,200

Jennifer is 10 years old and needs _____ milligrams of calcium every day.

She has had 2 glasses of milk today. How many milligrams of calcium has she had?

How many more milligrams of calcium does Jennifer need today? _____

What snacks could Jennifer enjoy to help her meet her calcium goal? _____

Calcium Sources

1 cup milk	300 mg
1 cup yogurt	345 mg
1 string cheese	150 mg
1 slice cheese pizza	185 mg
1/3 cup almonds	120 mg
1/2 cup broccoli	50 mg
1 orange	50 mg
1 corn tortilla	40 mg

Your Skeleton

When you were born, you had more than 300 bones in your body. Some bones, like the ones in your head and hands, grow together as you grow up. By the time you are 20 years old you will have 206 bones. Your bones connect to form your skeleton.

LOOK AT THE SKELETON TO ANSWER THESE QUESTIONS:

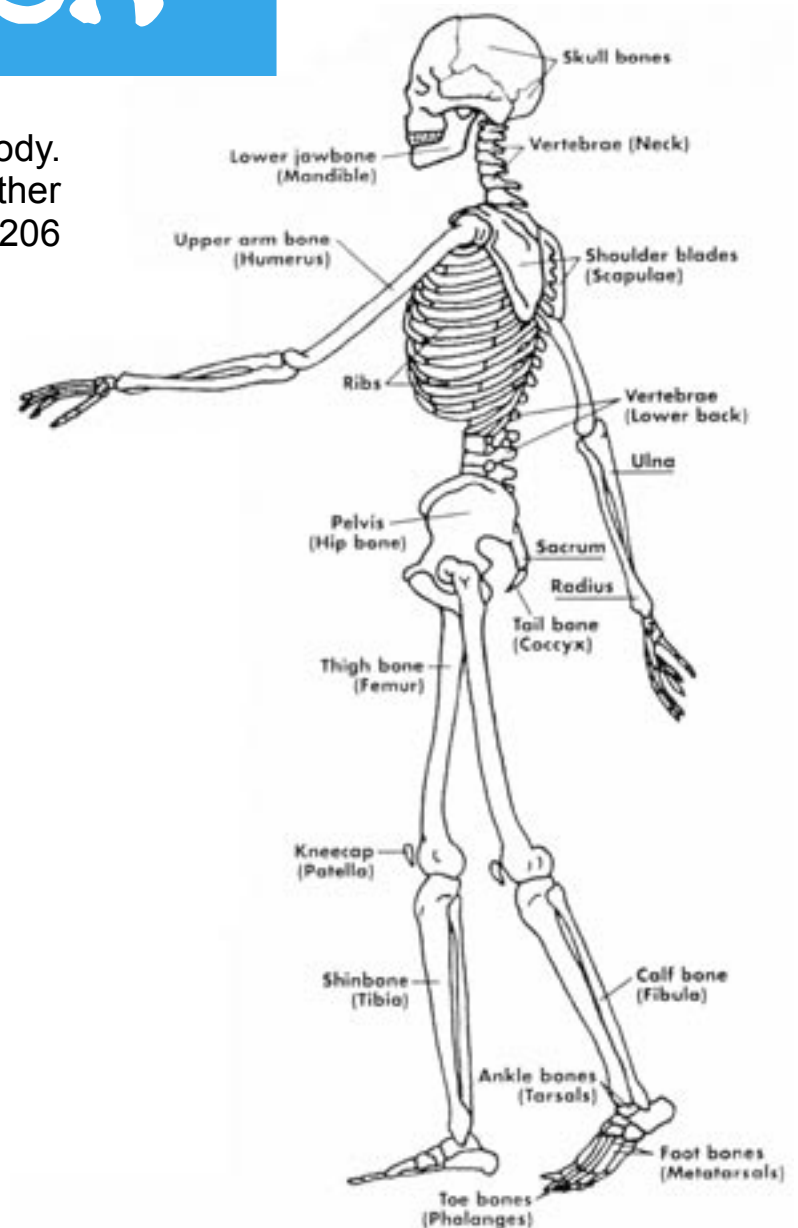
1. What is the longest bone in your body?

2. Which bones protect your heart and lungs?

3. What are the bones in your spinal column called?

4. What bones protect your brain and eyes?

5. What bone helps you chew food?




Calcium — Are You Getting Your Fair Share?



You need calcium at every age and stage of life. Calcium helps build strong bones and teeth. It may prevent diseases such as osteoporosis, high blood pressure and certain cancers. Are you getting your fair share of calcium? Find out for yourself.

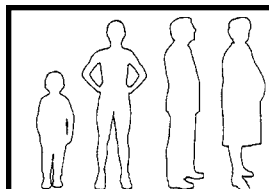
Instructions:

1. For each food listed below, write the number of servings you eat or drink on a typical day.
2. Multiply your number of daily servings by the calcium point value for each food.
3. Total your points and compare your total with the recommended number for your age.

	# of Servings you eat or drink each day		Calcium Points	=	Your Points
1 cup of milk	_____	X	10	=	_____
1 cup of yogurt	_____	X	10	=	_____
1-1/2 ounces of cheese	_____	X	10	=	_____
10 ounce milkshake	_____	X	10	=	_____
1 cup of macaroni & cheese	_____	X	10	=	_____
1/2 cup of tofu with calcium	_____	X	10	=	_____
3 ounces canned salmon w/bones	_____	X	5	=	_____
1/2 cup of pudding	_____	X	5	=	_____
1 slice of pizza	_____	X	4	=	_____
1/2 cup frozen yogurt or ice cream	_____	X	3	=	_____
1/2 cup of okra or cooked greens	_____	X	3	=	_____
1/2 cup of cottage cheese	_____	X	2	=	_____
			YOUR TOTAL		_____

Need to bone up on calcium? Try these snacks!

- Fresh fruit and yogurt
- Chocolate milk
- Cheese and crackers
- Cereal and nuts mixed with yogurt
- Grilled cheese sandwich
- Toaster waffle topped with frozen yogurt
- 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



If You Are...

Under 8 years old:

9 to 18 years old:

19 to 50 years old:

50 years old or older:

You need at least 30 points

You need at least 40 points

You need at least 30 points

You need at least 40 points

Cups of Calcium



Objective

To demonstrate the amount of calcium in the body at various ages.

What to Do

Assemble: 10 pounds white flour, clear resealable plastic bags (gallon, quart and pint size), measuring cups.

1. Measure flour into bags according to directions below.
2. Label bags by age group.

Amount of Flour

1/4 cup
3-1/2 cups
7 cups
11 cups
6-1/2 cups

Stage of Life

newborn
10-year-old
15-year-old
adult
adult with of 30-40% bone loss from osteoporosis

Discussion

Good bone health is important at all ages. When your diet doesn't provide enough calcium for everyday life functions (such as blood-clotting and regulating your heart beat), your body takes what it needs from your bones. Over time, this can weaken bones to the point that they break easily.

Calcium becomes part of your bones' framework. The more calcium your bones contain, the stronger and more dense they are.

Vitamin D is a bone-builder, too. It helps your body absorb calcium from food and helps deposit mineral into your bones. You can't keep bones healthy without the vitamin D-calcium partnership. Phosphorus and magnesium are also major mineral components of bones.

Childhood and teenage years are critical times to build peak bone mass. Nearly half of adult bone mass is formed during adolescence.

Questions & Answers

Q Why do cows have ear tags?

A Ear tags are used to identify the cow. Each cow has a different tag. It's like your social security number. The tag provides a way for the dairy to keep track of the number of pounds of milk the cow is producing, her health records and information on her calves.

Q How many stomachs does a cow have?

A Some people have heard that cows have four stomachs. Actually, a cow has one stomach but it has four compartments.

Q Why is milk white?

A Milk contains casein. It is the milk protein that is rich in calcium and is white

Q Can all cows make milk?

A Only cows that have had a calf can produce milk.

Q Does chocolate milk have as much calcium as white milk?

A Yes, chocolate milk provides all the nutrients of white milk. The chocolate flavoring adds a few calories because of the sweeteners.



Recipes: Try making a smoothie at home

- Pull out the blender
- Combine the ingredients.
- Blend until smooth. Don't forget the lid - and don't put a spatula or spoon in the blender while it's running. Very messy.

Banana

1 cup milk
1 peeled banana
1/2 cup frozen yogurt
1 teaspoon vanilla

Orange

1 cup milk
1 scoop vanilla ice cream
1/2 cup orange juice

Chocolate-Peanut Butter

1 cup chocolate milk
2 tablespoons peanut butter
1/2 cup chocolate frozen yogurt

Berry

1 cup milk
1/2 cup frozen berries
2 tablespoons honey

Feed Your Bones

Everyone needs calcium. Calcium, along with vitamin D and exercise, helps make bones stronger. If you did not have calcium in your bones, they would be soft enough to tie into knots. Babies and children need calcium for growing bones and teeth. Adults need calcium to keep their bones strong.

UNSCRAMBLE THESE FOODS THAT CONTAIN CALCIUM:



Likm _____

eechse _____

tgoury _____

mearc cei _____

ensrdias _____

mosaln _____

ccolibro _____

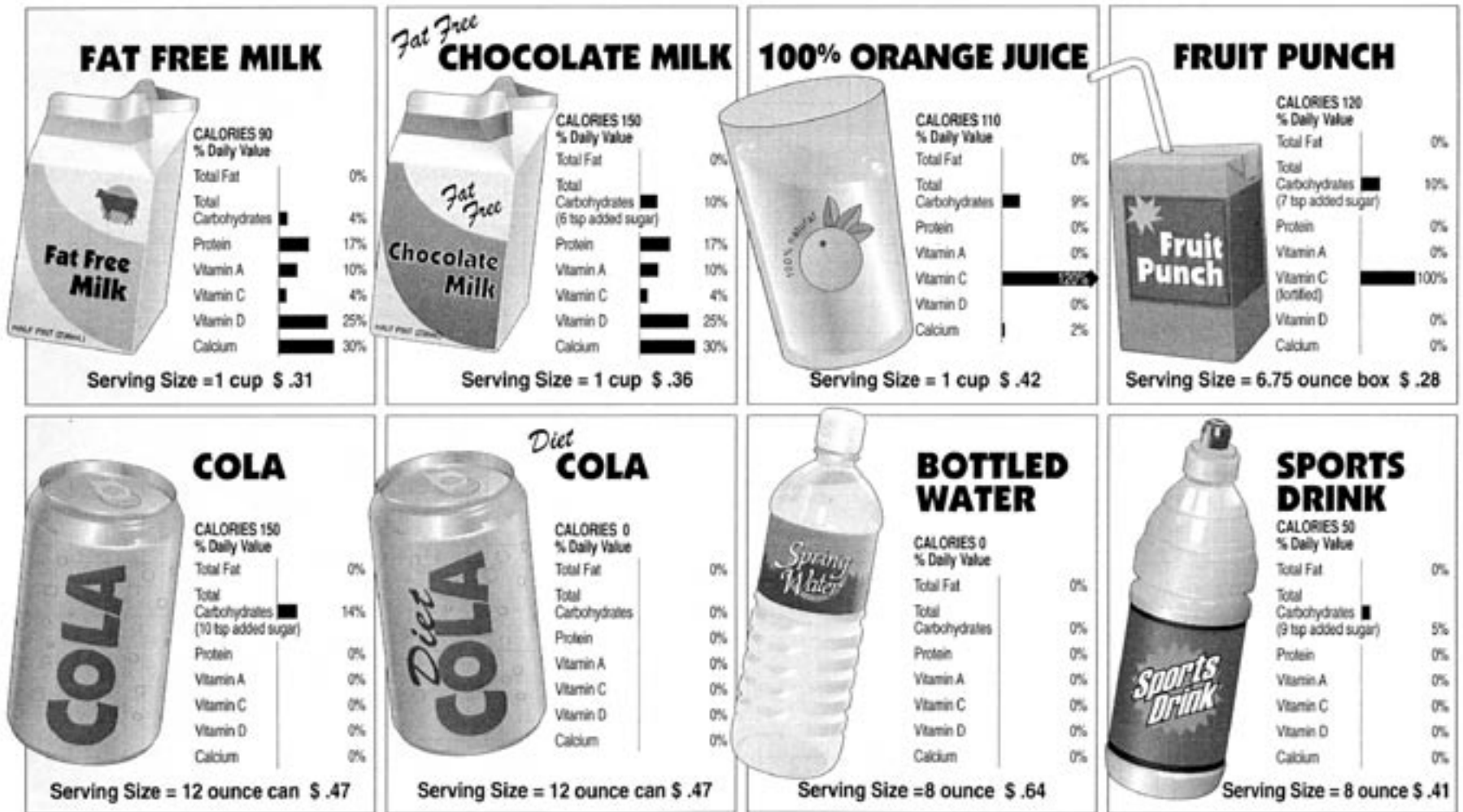
You need calcium every day. If you are 4 to 8 years old, you need 800 milligrams of calcium every day. From age 9 to 18, you need 1,300 milligrams of calcium every day.

Historically speak²ing.....

- 1624 Cows reach Plymouth Colony.
- 1834 Inventor Jacop Perkins obtains a British patent for the first refrigerator unit.
- 1856 Gail Borden received the first patent on condensed milk.
- 1890 Test for fat content of milk and cream perfected by Dr. S. M. Babcock.
- 1908 First compulsory pasteurization law (Chicago).
- 1919 Homogenized milk premiers on East Coast.
- 1932 Method of vitamin D fortification made practical.
- 1932 Plastic-coated paper milk carton introduced.
- 1942 Home milk delivery begins as a war conservation method.
- 1948 Ultra-high temperature pasteurization introduced.
- 1964 Plastic milk container introduced.
- 1974 Nutrition labeling of fluid milk products.
- 1980 American Dairy Association introduces the "Real" dairy seal.
- 1985 Missing children program launched on milk carton.
- 1988 Lower-fat dairy products gain widespread acceptance.
- 1994 Nutrition Labeling and Education Act requires mandatory labeling.
- 1994 Milk mustache ad campaign begins.



Think Your Drink!



When it comes to NUTRITION, not all drinks are created equal. Which drink gives you the most nutritious “bang for your buck?”

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Rethink Your Drink

The National Academy of Sciences increases calcium recommendations

- Kids ages 6-8 need 800 mg or about three servings of milk and Milk Group foods each day.

- Kids ages 9-18 need 1,300 mg or about four servings of milk and Milk Group foods each day for their bones to reach peak density.

- Adults need 1,000 mg of calcium a day - equivalent to 3 servings of milk or Milk Group foods per day.

- Adults over age 50 need even more calcium because aging can cause bone loss - 1,200 mg of calcium a day.

According to USDA’s 1994-1996 Continuing Survey of Food Intakes by Individuals (CSFII), nine out of 10 teen girls and seven out of 10 boys are not meeting their calcium recommendations. About two-thirds of children 6-11 do not meet their calcium recommendations.

The average American consumes only 500 to 700 mg of calcium per day falling short of the recommended daily allowance guidelines. Women in particular need more calcium with

Research indicates that calcium also plays a role in preventing chronic diseases such as high blood pressure, kidney stones, osteoporosis and some forms of cancer.

Health Implications

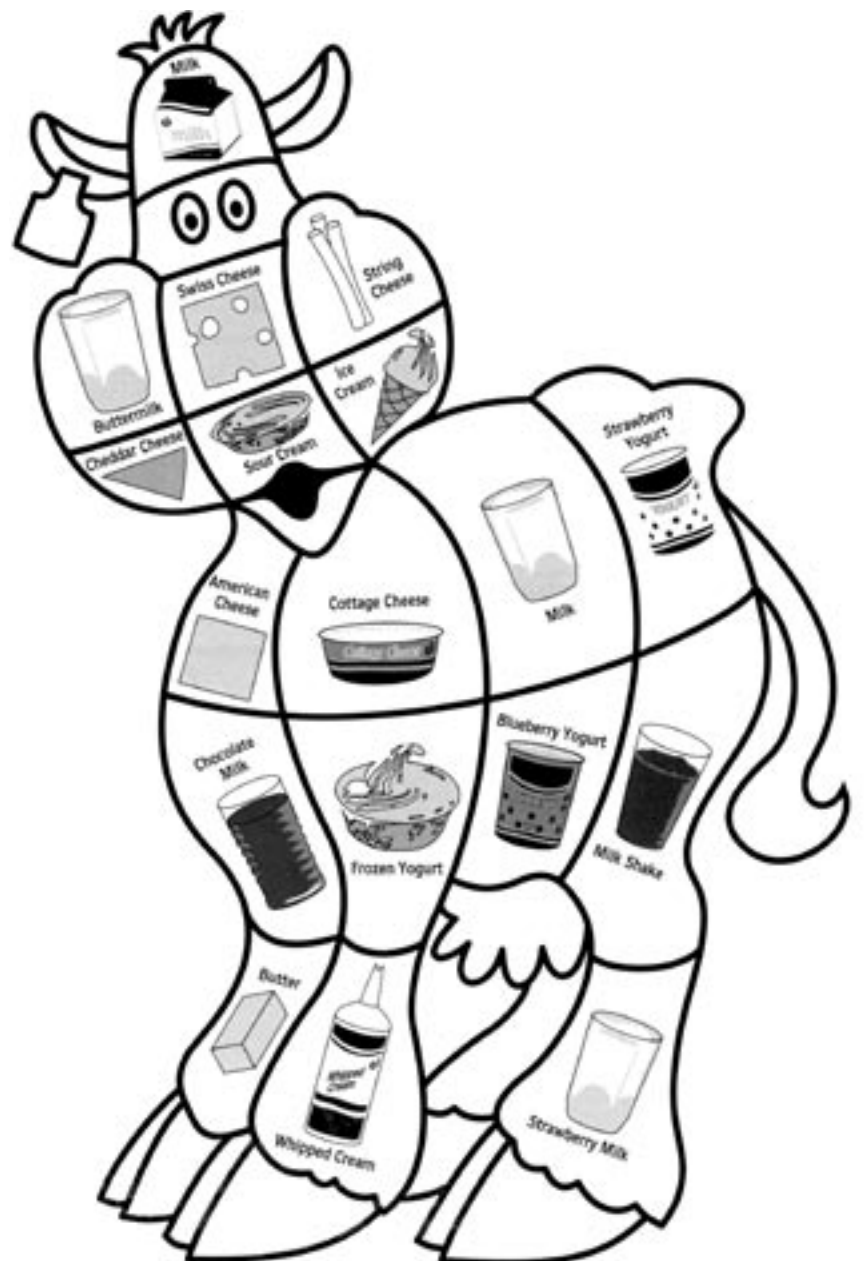
During the teenage years, many young adults substitute soft drinks for milk. These years are critical for teens to consume calcium and other nutrients because:

- 15 percent of their adult height,
- 50 percent of adult body weight, and
- 45 percent of adult skeletal mass are gained during adolescence.

A lack of calcium can also set the stage for osteoporosis and bone fractures later in life.

It is estimated that 28 million Americans are affected by osteoporosis and that osteoporosis is responsible for 1.5 million fractures a year.

The estimated national direct expenditures for osteoporosis and associated fractures are \$14 billion each year (\$38 million each day). The costs continue to rise.





Wyoming Ag in the Classroom

Volume 2 TEACHER GUIDE

Dear Teachers,

People in the past were very aware of the role agriculture played in their lives. Nearly everyone was connected to the land for food production.

Today fewer people are needed to produce the food we eat, so fewer people have contact with the farming and food production system. Wyoming Ag in the Classroom and Western Dairy Council hopes this issue of “Country to Classroom” will be an added resource to your teaching materials. You can be the one who helps students connect with the land and understand that there is more to milk than reaching for it at the grocery store.

As a non-profit nutrition and health resource organization, we have a variety of tools to assist you in the classroom. Call us at 800-274-6455 to order a catalog of our nutrition education materials.

Sincerely,
 Judy Barbe
 Western Dairy Council
 Wyoming Program Manager
 800-274-6455



Potpourri...Discussion Prompts and Projects

Lesson Ideas:

Health: Have your students record what and how much they eat and drink for two days. Using the graph on page 4, have them determine if they are consuming at least 1,300 milligrams of calcium. If they are not meeting their nutrient needs, discuss that they can do to improve their food choices.

Math: Collect empty milk cartons and jugs in various 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 gallon, etc.

Math: How many quarts of milk will a cow produce each day? A cow can produce 8 to 10 gallons of milk each day. 4 quarts = 1 gallon so 8 gallons x 4 quarts = 32 to 40 quarts of milk each day.

Food Science Activity: Make butter. Pour room temperature whipping cream into clean jars with tight fitting lids. Have students shake jar vigorously. Within 10 minutes clumps of butter will form. Add salt for flavor and spread on crackers.

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

Discussion: Ask your students to imagine they do not have home refrigerators and that stores don't have frozen food sections. How would their life and food choices be different?

In earlier times in order to have fresh milk you had to have a cow. Ask your students to imagine that they live during that time and describe how eating would be different than today.

Wyoming Content and Performance Standards 4th and 8th Grade

Health Content Standards: 1. Health Promotion and Disease Prevention; 2. Access Health Information, products, and services; 3. Self Management; 4. Influence of Culture, media and technology; 6. Goal Setting and Decision - Making Skills; 7. Advocating for Health
 Mathematics: 1. Number Operation and Concepts; 2. Geometry; 3. Measurement; 4. Algebraic Concepts and Relationships; 7. Problem-solving and Mathematical Reasoning
 Social Studies: 2. Culture/Cultural Diversity; 3. Production, distribution, and consumption; 4. Time, continuity, and change; 5. People, Places, and Environments; 6. Social Studies Processes and Skills;
 Science: 1. Basic Concepts and Knowledge; 2. Unifying Concepts and Processes; 4. Habits of Mind; 6. Science in Personal and Social Perspective.
 Language: 1. Reading; 2. Writing; 3. Listening; 4. Speaking; 5. Language ARS Integration

Additional Resources

From Western Dairy Council:

Pyramid Explorations: a 4th grade program to teach your students good eating habits, sound nutrition and the Food Guide Pyramid. Easy-to-use, colorful and hands on, this program supports Wyoming Health Standards. Complimentary to qualifying teachers.

Milk From Cow to You: This educational kit teaches the important production and processing steps that protect the high quality, safety and good flavor of milk. Targeted to 3rd - 5th-grade students. \$7.00

Healthland USA: Students learn about the 50 states as they “travel” in teams across the United States by being physically active and eating from the Five Food Groups. Targets 5th grade. \$10.00

Videos

Borrow these videos free from Western Dairy Council’s video loan library. Call 800-274-6455 to request a video.

Make Mine Milk: Learn where milk comes from, how milk is transported and processed and how milk contributes to a nutritious diet, 25 minutes - upper elementary.

A Crash Course on Calcium: This video follows three students who launch an investigative report to uncover the critical role calcium plays in developing and maintaining strong bones for active lifestyles. 20-minutes - upper elementary to middle school.

The Food Pyramid: High Five for a Healthy You: In this upbeat video, teens and celebrities discuss healthy decision-making using the Food Guide Pyramid. Role models speak about how food and activity choices improve performance. 14:30 minutes - upper elementary to middle school.

Web sites: www.

nutritionexplorations.org
 rated “Among the Best” by Tufts Nutrition Navigator, Nutrition Explorations is an exciting web site for educators. Teacher Central offers fun and easy-to-use classroom activities, current nutrition

Answers to Feed Your Bones Word Scramble	Answers to Your Skeleton
1. Milk 2. Cheese 3. Yogurt 4. Ice Cream 5. Sardines 6. Salmon 7. Broccoli	1. Thigh bone (femur) 2. Ribs 3. Vertebrae 4. Skull bones 5. Jawbone (mandible)
Answers to Feed Your Bones	
Jennifer needs 1,300 mg of calcium	
Two glasses of milk contains 600 mg	
Jennifer still needs 700 mg today	

“COUNTRY TO CLASSROOM” is a publication of WYOMING AGRICULTURE IN THE CLASSROOM.

Wyoming Agriculture in the Classroom is a cooperative effort of many Agriculture organizations and individuals around the state. Materials are compiled from Wyoming Department of Agriculture, United States Department of Agriculture, Wyoming Beef Council, Wyoming Ag in the Classroom, Montana Ag in the Classroom, Minnesota Ag in the Classroom, National FFA, Oklahoma Ag in the Classroom, and several other sources.

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