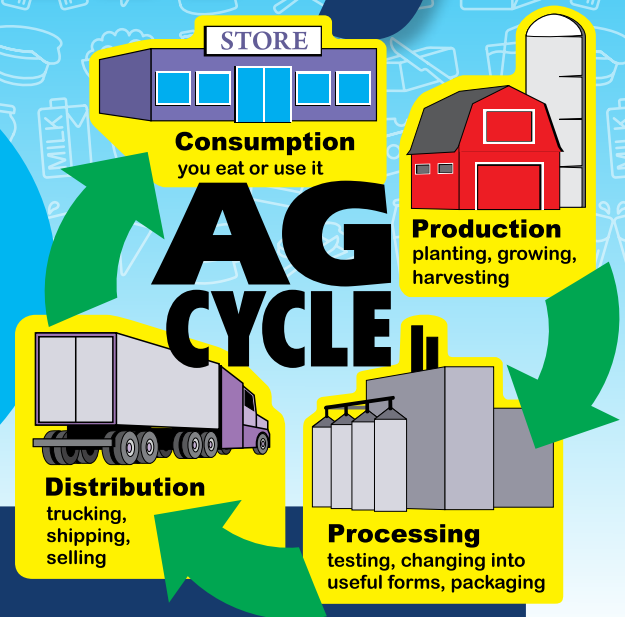




Dairy

The next time you drink a glass of milk or eat cheese or yogurt, think about the journey that dairy product has taken. How did it get from the cow to you?



Incredible Dairy Facts

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

1. Female dairy animals that are called _____ produce milk. The males are called bulls.
2. A cow produces milk after she has given _____ to a calf. She can have her first calf when she's about 2 years old.
3. Milk is measured in _____, and the average U.S. cow produces about 80 pounds (150 cups or 9 gallons) of milk each day.
4. Holsteins are one breed of dairy cattle. A Holstein cow's spots are like a _____. No two cows have exactly the same pattern of spots.
5. Some cows wear activity _____ to record how much they eat, sleep and milk.
6. Newborn calves usually live in _____ that keep them healthy by providing warm, dry bedding; protection from the weather; and fresh air.
7. Dairy cows eat a _____ called a total mixed ration. This includes hay and grains plus vitamins and minerals so cows have all the nutrients to produce wholesome milk.

Dairy Production

A Four-Part Stomach

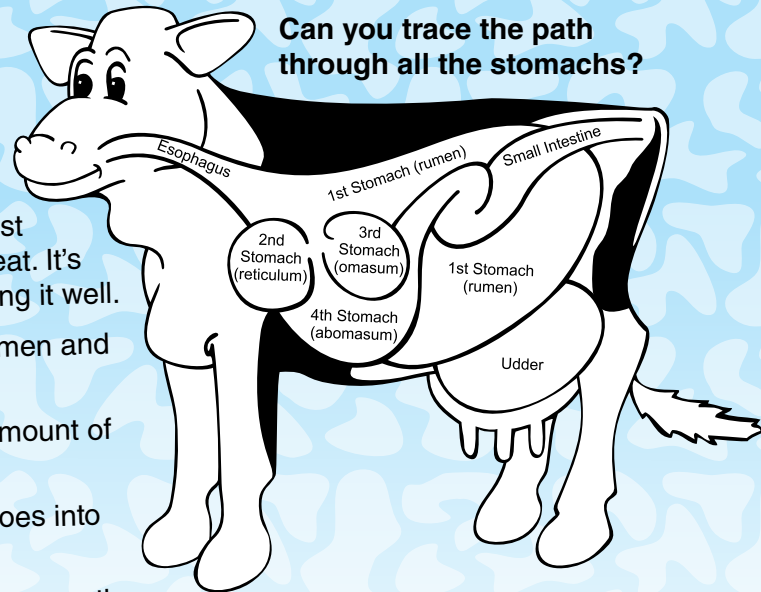
Cows are ruminants, which means they're one of the animals with a four-part stomach. That's why they can digest coarse feeds like hay that other animals and people can't eat. It's also why they can swallow their food quickly without chewing it well.

The food goes into the first and second stomachs – the rumen and reticulum.

When the cow has eaten her fill, she belches up a small amount of food, called a cud, to chew again.

After chewing her cud thoroughly, she swallows it, and it goes into the third stomach – the omasum.

From there it moves on to the fourth stomach – the abomasum – the true stomach where digestion actually occurs.



Can you trace the path through all the stomachs?

Moo Math

1. Even cows need a break. A cow can produce milk for about 300 of the 365 days in a year. If she produces 144 cups of milk per day, how many cups does she produce in 300 days?
2. There are 16 cups in 1 gallon. How many gallons can that cow produce in a day?
3. In 1980, North Dakota had 93,000 dairy cows. Today the state has only 10,000 dairy cows. How many more dairy cows were in North Dakota in 1980 than 2024?
4. Today, farmers can milk a cow in about 7 minutes with a milking machine. If a farmer has 6 milking machines going at once, how long would it take to milk 48 cows?
5. There are about 9 million milk cows in the U.S. today, and about 90% of them are of the black and white Holstein breed. How many U.S. cows are Holsteins?

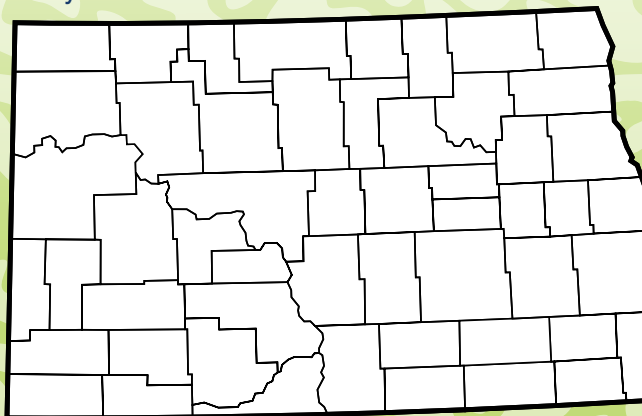
Natural Recyclers

Cows eat about 100 pounds of food and drink at least 50 gallons of water each day. A cow's diet can include grass, hay and grains such as corn. Cows also may consume distillers grains from ethanol production, soybean meal and canola seed after the oil has been pressed out of them, and cottonseed after the cotton fibers have been removed. These products, which were once thrown away, are actually good for cows. Cows can unlock the energy and nutrients in these products that would otherwise go to waste. That's one reason why cows are often referred to as the original recycler in agriculture.



North Dakota's Dairy Cows

On the map, label each county that has a dairy with its letter.



- A. Barnes
- B. Cass
- C. Dickey
- D. Foster
- E. Hettinger
- F. Kidder
- G. LaMoure
- H. Logan
- I. McHenry
- J. McIntosh
- K. Morton
- L. Ransom
- M. Sargent
- N. Stark
- O. Stutsman

Dairy Processing

At the Processing Plant

Milk samples are tested in a lab to ensure that only the purest milk is used. The milk is *homogenized* to break the butterfat particles into thin, uniform globules. If milk wasn't homogenized, the cream would rise to the top so you would have to shake or stir the milk before serving.

The milk then is *pasteurized*. That means it's heated to 161 degrees F for 15 seconds to kill bacteria, then rapidly cooled to prolong shelf life.

Milk packaged for drinking has Vitamin D and Vitamin A added, and some also has flavor added to make delicious chocolate milk. Packaging machines fill and seal the cartons or jugs.

Almost half the milk produced in the U.S. is made into more than 300 different types of cheese.

List the different kinds of cheese you know.

List other dairy products you're familiar with.



Find the Real Seal on genuine dairy products at home.

How Much Milk Does It Take?

A tall, cool glass of milk isn't the only way to get milk's vitamins and calcium. You can get them in all kinds of different dairy products.

How many cups of milk does it take to make each of the products listed below? Draw a line from the food to your guess.

1 pound butter

8 ounces yogurt

1/2 gallon ice cream

1 pound cottage cheese

1 pound American cheese

2 cups evaporated milk



Say Cheese!

To make cheese, milk is heated and mixed with a *culture*. Cultures contain different types of good bacteria that give various cheeses their distinct flavors, textures and colors. The culture makes the milk curdle, clumping the milk's proteins together to form lumpy curds and liquid whey. (Remember Little Miss Muffet's snack?)

The whey is drained from the curds. You can eat the curds as fresh cheese, or you can wait until the curds are aged.

The kind of milk used, the amount of fat in the milk, how the curds and whey are formed, and how the cheese is stored also account for different colors and tastes. Even the sizes and shapes of cheeses are different.



Career Corner



Maartje Murphy Owner of Cows and Co Creamery, and Duchessa Gelato

Carrington, North Dakota



Maartje (pronounced March-a) Murphy was born in the Netherlands on her family's dairy farm. They moved to Canada when she was 7 then to Carrington, N.D., in 2008, to expand their dairy farm. Today her parents, Corne and Conny van Bedaf, and brothers Piet and Dries milk 1,500 cows, primarily Holsteins.

"When I conceived the idea of an on-farm creamery, I knew it was the perfect way to put my own twist on the family business and legacy," Maartje said. "I love sharing our story with each customer who tries our products. Gelato was a great starting point, as I had so many wonderful memories savoring gelato with my Omas and Opas (Grandmas and Grandpas) in the Netherlands."

Gelato originated in Italy. It is similar to ice cream but is made with more milk than cream and is churned warmer and slower, which results in a smooth, creamy dessert.

"On production days, I prepare the gelato lab early in the morning. The gelato base is made the day before in the authentic Italian hot process, which ages overnight. The next day I churn the individual flavors and pack them into pints or pozzettis (larger specialized metal containers). After a day of churning, everything is cleaned and made ready for the next day."

The Cows and Co team hand pack 500 to 1,000 pints a week, with traditional European flavors and a few with an American twist. Duchessa Gelato is available at their on-farm Creamery Café and Milkhouse farm store; at Brewhalla Market in Fargo; and by shipping.

In addition to gelato, Maartje and crew produce artisan Gouda cheese, cheddar cheese curds, and glass-bottled milk and yogurt.

Maartje juggles processing and engaging with customers while managing employees and bookwork, and being a mother. Her husband and mother help full time to keep up with demand, plus they have several employees.

"The most important thing that I have learned through the years is to go for it! You have to take action on your dreams because no one else is going to do it for you," Maartje said.

Dairy Distribution

Milk is processed and distributed quickly so it's fresh when you buy it. The milk that arrives at the store today was milked from cows just two days ago.

The Journey of Milk

Milk travels through many steps from the farm to your table. Think about milk production, processing, distribution and consumption to number these steps 1-9 in the order in which they happen.

- The milk is tested for quality and homogenized and pasteurized if it's to be sold as liquid milk.
- Cows are housed in comfortable barns and milked 2 or 3 times each day.
- Finally, you enjoy the taste and nutrition of dairy foods.
- Some of the milk is processed into cheese, yogurt, ice cream and other dairy products.
- The milk is transported in a refrigerated tanker truck to the processing plant.
- The dairy products are delivered with refrigerated trucks to stores, schools and restaurants.
- 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.
- You purchase dairy products at the store, at school or at a restaurant.
- The milk is pumped into a refrigerated storage tank on the farm.



Midwest Dairy Photos



Agweek Photos



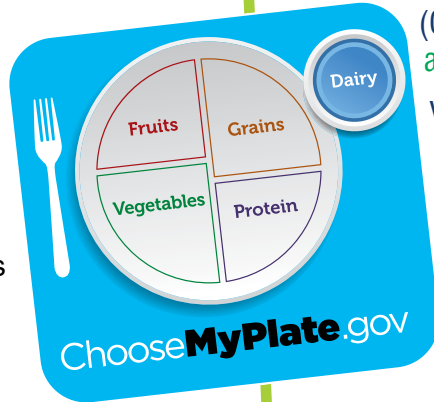
Dairy Consumption

Undeniably Dairy



Are You Calcium Smart?

Your body needs calcium for strong bones and teeth. The best way to get calcium is from milk and other dairy foods. The U.S. Department of Agriculture (USDA) recommends on the www.MyPlate.gov website that kids 9 and older need 3 servings of dairy each day. One serving equals 1 cup of milk or yogurt, 1½ ounces of cheese, 1 cup of pudding or frozen yogurt, or 1½ cups of ice cream.



List the foods you ate from the dairy group today and yesterday.

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 (carbohιδrates 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)

Cheese Around the World

More than half of the milk produced in North Dakota is made into cheese. Many cheese varieties originated in Europe. On this European map, write the **bold** letter of the countries where these cheeses originated.

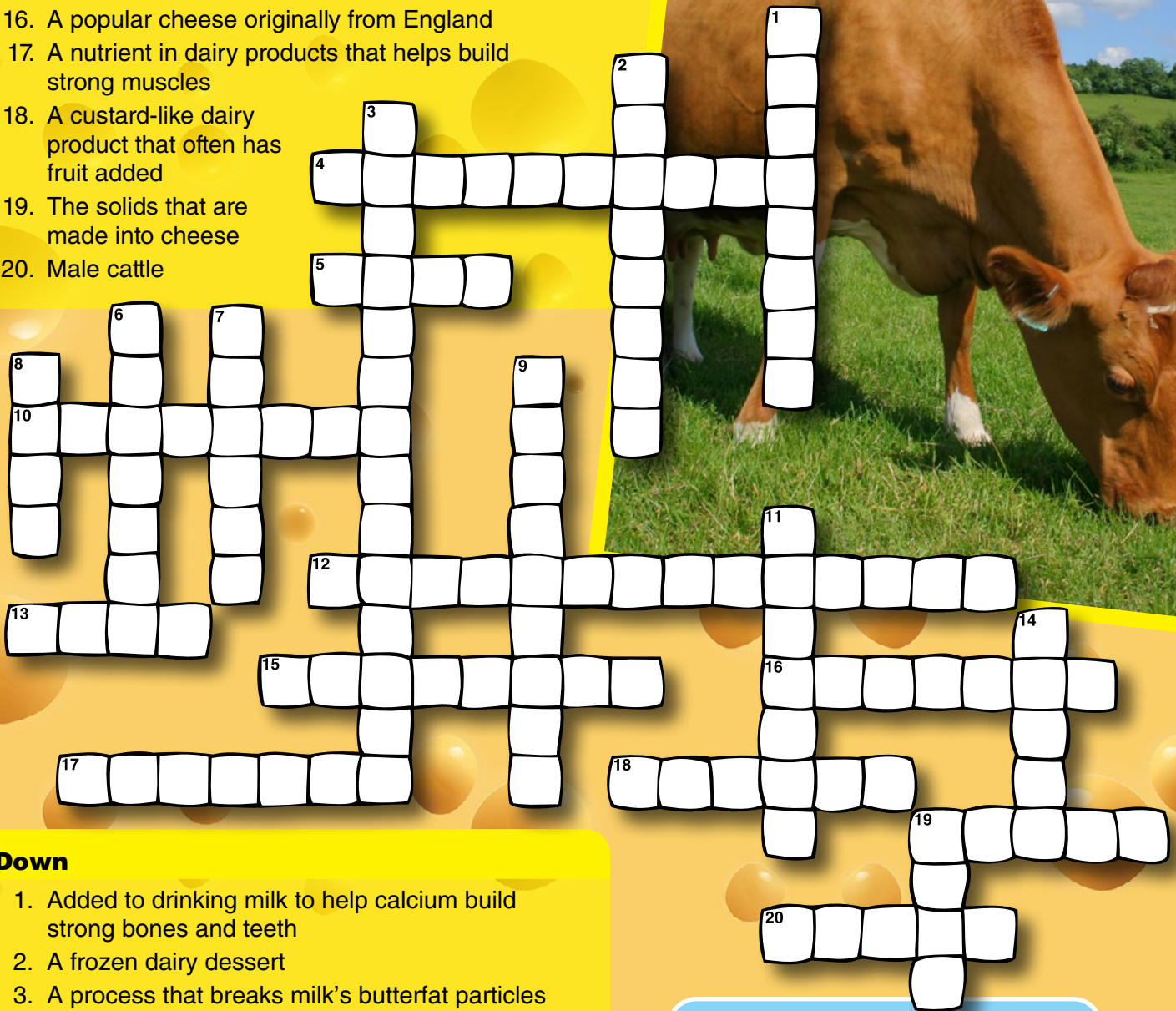


- A** Mozzarella, Provolone, Parmesan – **Italy**
- B** Brie, Camembert, Roquefort – **France**
- C** Feta – **Greece**
- D** Cheddar, Stilton – **England**
- E** Swiss, Gruyère – **Switzerland**
- F** Havarti – **Denmark**
- G** Jarlsberg – **Norway**
- H** Gouda, Edam – **Netherlands**
- I** Limburger – **Belgium**

Crossword Puzzle

Across

4. Italian cheese used on pizza
5. Female cattle that produce milk
10. The black and white breed of dairy cattle
12. Heating to 161 degrees F for 15 seconds to kill bacteria
13. Eaten by livestock
15. Milk that is fat free
16. A popular cheese originally from England
17. A nutrient in dairy products that helps build strong muscles
18. A custard-like dairy product that often has fruit added
19. The solids that are made into cheese
20. Male cattle



Down

1. Added to drinking milk to help calcium build strong bones and teeth
2. A frozen dairy dessert
3. A process that breaks milk's butterfat particles
6. The starter that helps produce yogurt and cheese
7. Cream is churned into this spread
8. The liquid part when cheese is made
9. Milk with its natural fat
11. A nutrient in dairy products that helps build strong bones and teeth
14. A cow drinks lots of this each day
19. A young cow or bull

WORD BANK

Bulls	Curds	Protein
Butter	Feed	Skim Milk
Calcium	Holstein	Vitamin D
Calf	Homogenization	Water
Cheddar	Ice Cream	Whey
Cows	Mozzarella	Whole Milk
Culture	Pasteurization	Yogurt

Take this Ag Mag home to share what you've learned about dairy.



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istockphoto.com.

Find answers to the activities at www.ndda.nd.gov/agmag.



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