



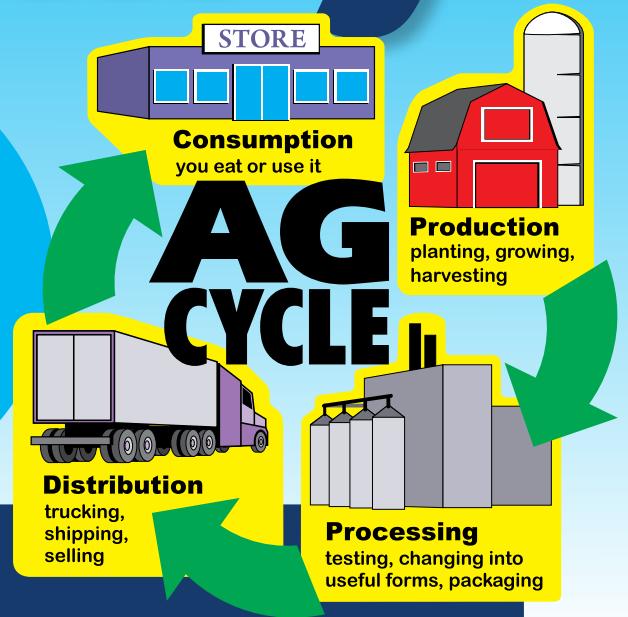
# Ag Mag

A Magazine about Agriculture for North Dakota Students



# 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, female**

1. Only \_\_\_\_\_ dairy cows 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 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 \_\_\_\_\_. 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

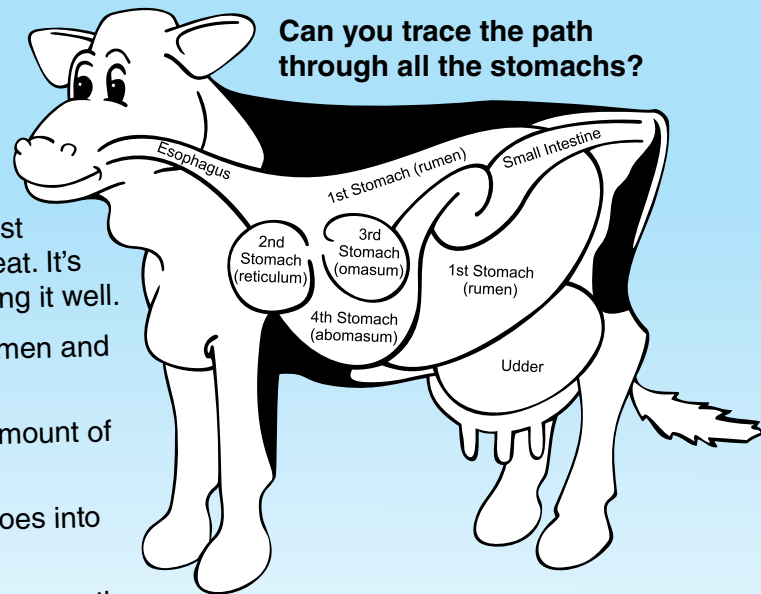
Cows are ruminants, which means they're one of the animals with a four-part stomach. That's why they can digest coarse feeds like hay that other animals and people can't eat. It's also why they can swallow their food quickly without chewing it well.

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.

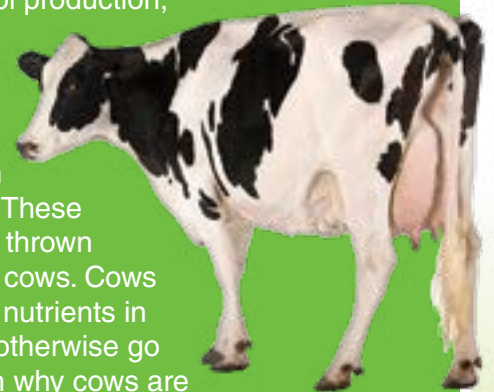


## Moo Math

1. Even cows need a break. A cow can produce milk for about 305 of the 365 days in a year. If she produces 144 cups of milk per day, how many cups does she produce in 305 days?
2. How many gallons can that cow produce in a day?
3. Before milking machines were invented in 1894, a farmer could milk 6 cows per hour by hand. How long would the milking take if the farmer had 15 cows?
4. Today, farmers can milk a cow in about 5 minutes with a milking machine. If a farmer has 6 milking machines going at once, how many cows can be milked in one hour?
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

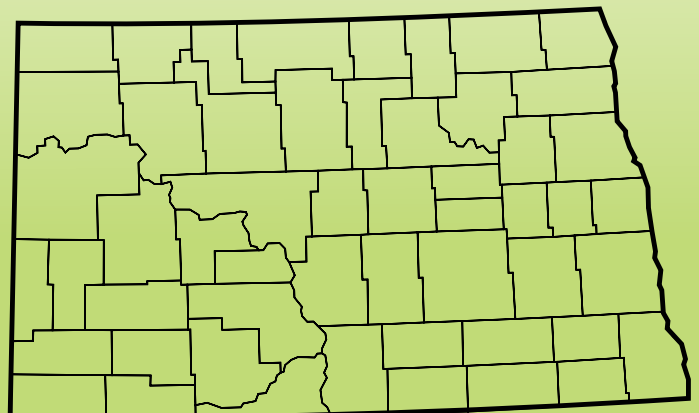
Cows eat about 90 pounds of food and drink at least 50 gallons of water each day. A cow's diet can include grass, hay and grains such as corn. Cows also may consume distillers grains from ethanol production, citrus pulp from making orange juice, canola seed after the oil has been pressed out of them and cotton seed 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

Dairy cows can be found across North Dakota. Use this map to identify counties with the most dairy cows.

Morton  
Emmons  
McHenry  
Foster  
Stutsman  
Logan  
Stark  
McIntosh  
Nelson  
Ransom



# 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.

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List other dairy products you're familiar with.

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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

12

8 ounces yogurt

11

1/2 gallon ice cream

0

1 dozen eggs

39

1 pound cottage cheese

19

1 pound American cheese

4

2 cups evaporated milk

1

## 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.







**Kriss Allard**  
Pride Dairy Owner  
Bottineau, North Dakota

If you've visited Mount Rushmore in South Dakota and had ice cream there, it might have been Thomas Jefferson Vintage Vanilla made by Pride Dairy in Bottineau, North Dakota.

"We use Thomas Jefferson's original recipe," said Kriss Allard, Pride Dairy owner. "It's been featured at Mount Rushmore since 2012 and is their #1-selling ice cream."

Jefferson's original recipe now requires eggs and milk that are pasteurized for food safety, but what makes the vanilla flavor especially delicious is the vanilla beans that are grown in Madagascar, the same place Jefferson would have gotten them from in his time.

Lloyd Shelton, Mount Rushmore's food and beverage director, said, "We call it having a taste of history because Jefferson wrote out that first recipe for ice cream in the U.S., and it's now in the Library of Congress."

In Bottineau, Kriss and his wife Tonya also make other unique flavors at Pride Dairy: juneberry and chokecherry from local fruits, and black licorice.

"We also make flavors people request but can't find in the store anymore, like butter brickle and

maple nut – 23 flavors in all," Kriss said. "We also make butter, creamy caramels and cow pies." Cow pies are coated ice cream on a stick.

"Pride Dairy started in 1930 when all the farmers in the area had dairy cows," Kriss said. "Farmers hauled their milk and cream into Bottineau where a lot of it had to be made into butter instead of sold as milk since there weren't refrigerated trucks yet. In 1940, the dairy started making ice cream, and in October 2018, we bought it."

When Allards purchased Pride Dairy, they knew they had a high-quality product, so they wanted to expand distribution.

"We took a small business and now have 22 trucks on the road delivering ice cream and other products," Kriss said. "We wanted to build a brand so people ask for Pride Dairy ice cream."

Kriss worked in grocery stores and other retail stores before purchasing Pride Dairy.

He encourages students, as they think about careers, to "work on your weaknesses, but since we revert back to our natural strengths, do what you enjoy – what you have a passion for. You can't call it work if you love what you do."

# Career Corner





# 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.



## 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 a world map, find the continent of Europe. On this European map, write the **bold** letter of the countries where these cheeses originated.

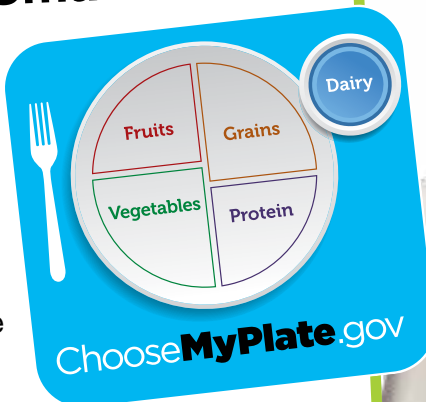
- A** Mozzarella, Provolone, Parmesan – **Italy**
- B** Brie, Camembert, Roquefort – **France**
- C** Feta – **Greece**
- D** Cheddar, Stilton – **England**
- E** Swiss, Gruyère – **Switzerland**
- F** Havarti – **Denmark**
- G** Jarlsberg – **Norway**
- H** Gouda, Edam – **Netherlands**
- I** Limburger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



# Dairy Consumption

## 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 ChooseMyPlate.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.

_____	_____
_____	_____
_____	_____
_____	_____
_____	_____



## 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)

## What's in Those Cartons?

Confused by whole, reduced-fat, low-fat and fat-free? These labels on milk cartons tell you how much fat is in the milk. Whole milk, as it comes from the cow, is usually about 3.25% fat naturally. That means if the milk was not homogenized and the fat or cream could rise to the top, 3.25% of the total amount of milk you poured would be cream. That's about 1 1/2 tablespoons of cream in each 8-ounce glass of milk.

Reduced-fat milk has 2% fat, low-fat milk has just 1% fat left in it and fat-free milk has no fat. All milk – whole or fat-free, flavored or white – contains the same amount of important vitamins and minerals.

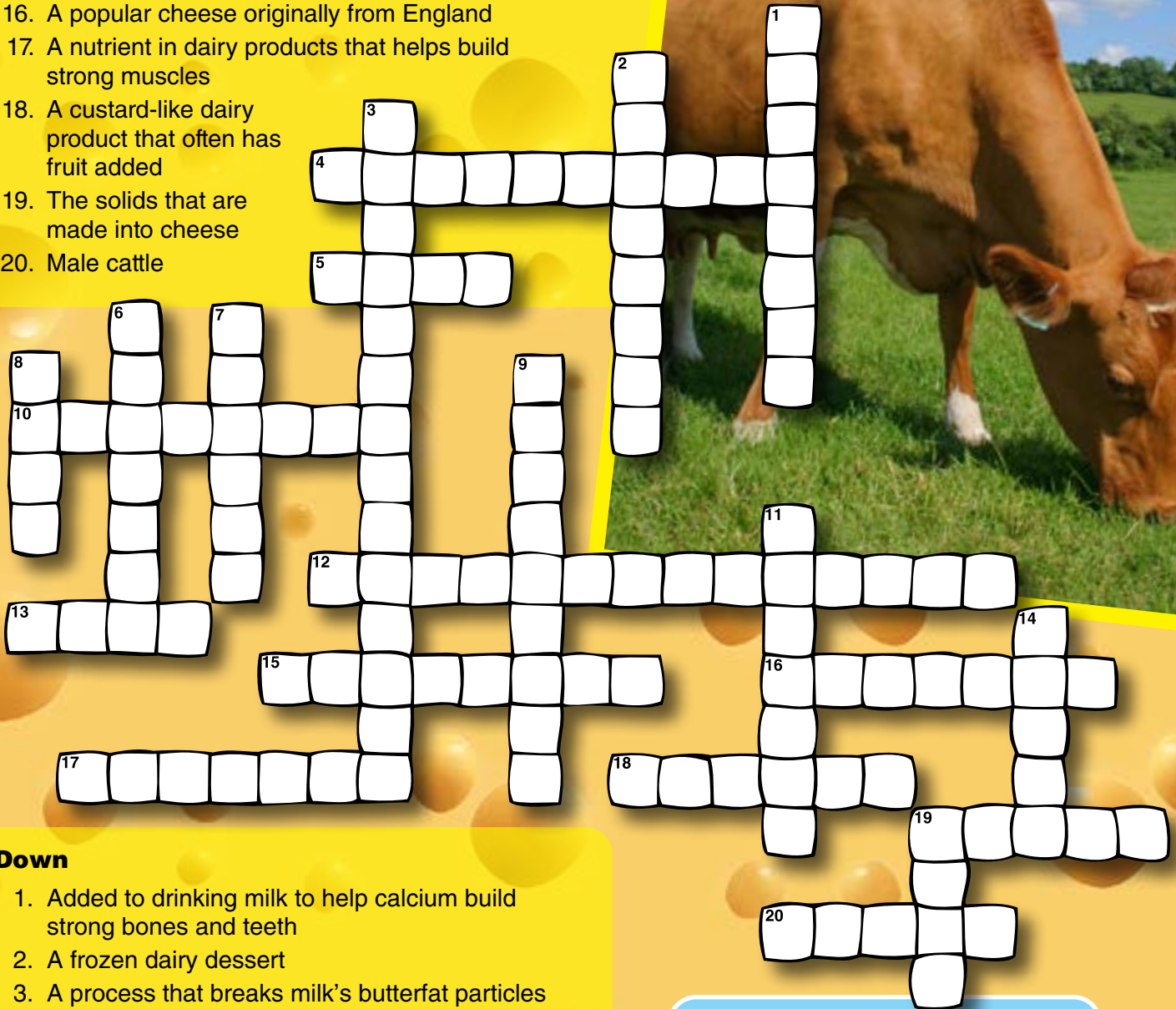




# Crossword Puzzle

## 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

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

# Ag Challenge:

## We need your help!

The ND Agriculture in the Classroom program has an exciting new project coming. We need your help to interview farmers in North Dakota. What would you like to know about farmers and farming? Do you want to know where farmers get their seeds? Do you want to know more about the machines farmers use? Teachers, please send the top three questions from your class to [mgaebe@nd.gov](mailto:mgaebe@nd.gov) and keep an eye out for upcoming content that could feature your questions.



Thank you to the following for providing information for this issue of North Dakota Ag Mag:

Midwest Dairy  
North Dakota State University  
North Dakota  
Agricultural Statistics  
Service  
Minnesota Agriculture  
in the Classroom  
North Dakota  
Agriculture in the  
Classroom Council  
North Dakota Farm  
Bureau

Photos from  
Midwest Dairy and  
[istockphoto.com](http://istockphoto.com).



The North Dakota Ag Mag is a project of the North Dakota Agriculture in the Classroom Council, which is organized through the North Dakota Department of Agriculture.

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Ag Mag Production by North  
Dakota State University Agriculture  
Communication: Becky Koch, Editor;  
Dave Haasser, Graphic Designer