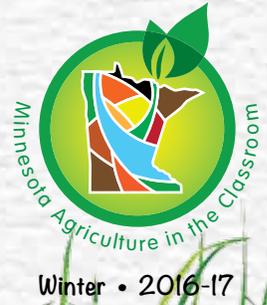


AgMag

Agriculture: Helping you every day!



Agriculture, the Land, and You!

What would people living in towns and cities do if there were no farmers?

Where would they get food? Wool? Building supplies? Flowers, trees, and shrubs? Farmers are producers of all these things. What would farmers do if there were no consumers to buy these things? What would it be like if each of us had to grow everything we need all by ourselves?

Consumers and producers need each other. We are interdependent. Without producers, people everywhere would not have the food, shelter, and clothing they need. Without the consumers, producers would not have enough places to sell their products.

Agriculture grows what we need and changes it to forms we can use. Getting those things into our hands is part of agriculture, too.

When you write a note, do you think about the tree fiber that went into the paper? As you eat your cereal, do you think about the soil, water, and workers between the grain field and your cereal bowl?

Agriculture starts with soil, seeds, water, and energy from the sun. Then millions of workers and billions of dollars change and move agricultural products from the land to you. Agricultural products come to you through supermarkets, lumberyards, drugstores, clothing shops, restaurants, Christmas tree lots, sports stores, and dozens of other places. Together, producers and

consumers help each other.

Find teacher guide and student resources at www.mnagmag.org



Steps Along the Way

Where do the supplies come from that are made into the things we eat, wear, and use every day? The **raw materials** come from Earth's **natural, renewable resources** through the work of farmers and growers. These raw materials go through a number of changes from raw product to final form. After all, a handful of wheat kernels or a hunk of wool freshly shorn from a sheep wouldn't do us much good in their raw forms.

Agriculture System

Most agriculture systems have 6 steps:

- 1. Producing:** Growing or raising plants and animals.
- 2. Processing:** Changing the raw materials into things we eat, wear, and use.
- 3. Distributing:** Getting the processed products to places like grocery stores and farm markets.
- 4. Marketing:** Advertising agricultural products in places like TV and radio ads, magazines and newspapers, and the internet to help people know about them.
- 5. Consuming:** Using or eating the final products.
- 6. Disposing:** Putting unused or waste products into recycling, compost, or garbage processes.

Discussion

1. What role do producers and consumers play in the agriculture system?
2. Why are sun, air, water, and soil part of the agriculture system?
3. What are some different kinds of marketing that you have seen or heard with agriculture products?

While most raw materials go through all these steps, some spend more time in processing than others. Why do you think that is? Which takes more time: grain between the field and your cereal box and bread, or carrots between the field and your salad bowl? What about your quarter-pound burger? It started out as a thousand-pound steer eating grass, corn, and soybean meal. Your bread began as "amber waves of grain" and your wooden hockey stick as a tree.



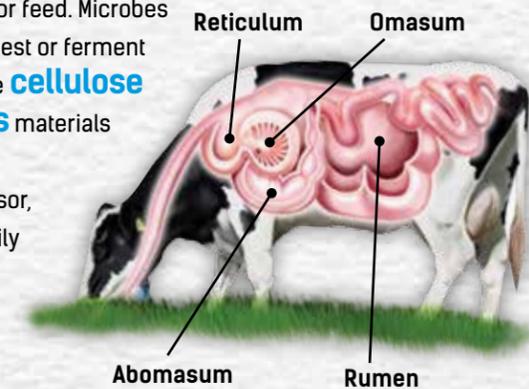
Alfalfa is also a major crop in Minnesota. It is a leafy plant that grows 2-3 feet tall. It is a perennial plant, which means it grows in the same place year after year. That way the farmer does not have to replant each year. Alfalfa is also a legume. Legumes put nitrogen into the soil, which is an important nutrient that helps feed other crops, like corn.

Awesome Alfalfa!

Do you know what alfalfa is? Cows eat alfalfa hay as part of their diet. Humans cannot digest alfalfa hay like cows can. Cows use those nutrients from the alfalfa hay to make something really useful: milk.

Why Cows Can Eat Alfalfa

While humans eat alfalfa sprouts on salads or sandwiches, most alfalfa goes to feed animals. Humans cannot digest most of the alfalfa plant, but we can digest milk from cows that eat alfalfa. This is possible because of how cows digest food. Humans have a stomach with one compartment—but cows have four compartments! The largest compartment is the rumen. It can hold 25 gallons of food or more. The rumen is a storage and **fermentation** vat for feed. Microbes in the rumen help to digest or ferment food, breaking down the **cellulose** from all of the **fibrous** materials cattle eat. Together they work like a food processor, allowing the cow to easily digest things humans cannot.



Did You Know...

- One cow drinks enough water each day to fill a bathtub.
- Minnesota is #6 in the number of dairy cows and #8 in milk production in the U.S.
- Dairy cows in Minnesota produce 1.1 billion gallons of milk each year.
- Dairy farms today produce about 3 times more milk than they did in 1960. They produce that milk with half as many cows.
- Minnesota is #6 in the U.S. for cheese production.

Matching and Naming

For each photo below, write the number and name of its step in the agriculture system. Hint: the images are not in order.



Word Find

For each word below, write the number of its step in the agriculture system, then find it in the puzzle.

- | | |
|----------------------------------|-------------------------------------|
| <input type="radio"/> Commercial | <input type="radio"/> Wash |
| <input type="radio"/> Recycle | <input type="radio"/> Transport |
| <input type="radio"/> Plant | <input type="radio"/> Compost |
| <input type="radio"/> Ship | <input type="radio"/> Cook |
| <input type="radio"/> Package | <input type="radio"/> Advertisement |
| <input type="radio"/> Drink | <input type="radio"/> Harvest |

F I U C E J J Q D D E B H
 T N E M E S I T R E V D A
 R L L P T N A L P Q T D R
 O A A T A D C E I L Z E V
 P K E I H C G E H E L B E
 S D O I C J K O S C M H S
 N Y T O B R I A Y L S F T
 A U X T C L E C G A Y J Y
 R O B W D C E M W E K Q T
 T S Z R Y R C O M P O S T
 D Z I X Z R Q N Z O N R U
 Y N Q X Y I F B X I C Q S
 K J B J C U F D N U U P M



How the Agriculture System Works With Dairy Products



Milk Math

A dairy nutritionist is an animal health professional who specializes in the nutritional needs of dairy cows. Nutritionists recommend the best diets for cows and monitor how cows respond to their feeding program.

1. A dairy nutritionist recommends feeding 60 pounds of feed to dairy cows every morning. The feed is a mix of hay, silage, and soybean meal. The mix is 70 percent hay, 20 percent silage, and 10 percent soybean meal. Show each of these numbers in a percent, decimal, and fraction form in the chart below.

	Percent	Decimal	Fraction
Hay			
Silage			
Soybean Meal			

2. Determine how many pounds of each ingredient to include in the feed. If 70 percent of the feed is hay and the feed weighs a total of 60 pounds, how many pounds of hay should you add? How many pounds of silage? How many pounds of soybean meal?

Example:
 (percentage of ingredient in decimal form) x 60 = Total Pounds

Hay _____ x 60 = _____ Silage _____ x 60 = _____

Soybean Meal _____ x 60 = _____

Photos Courtesy University of Minnesota Agricultural Experiment Station and Midwest Dairy Association.



Robot Milkers!

Did you know that robots have been created that can milk cows? Right now there are 88 farms with a total of 234 robots in Minnesota. One robot can milk 60 cows every 24 hours. That helps farmers spend less time overseeing the milking and more time on farm business.



Trivia

Q: What is special about the spots found on Holstein cows?
A: They are like snowflakes—no two are alike.

1

Producing

Dairy cows are raised on farms. Having a calf allows the cow to begin to produce milk. Once they have milk, cows must be milked at least twice each day. Farmers used to milk cows by hand, but today most cows are milked by special milking machines. A dairy cow in Minnesota produces 19,700 pounds of milk every year. That is nearly 2,300 gallons of milk.



2

Processing

The cow's milk is put into a refrigerated truck and taken to a processing plant. Before the milk is processed, it is tested for quality and safety. If it fails a test, it is discarded right away. Only pure, healthy milk will be used. Then the milk is pasteurized and homogenized. Pasteurized milk is heated to a minimum of 145 degrees, then quickly cooled down. This destroys many of the bacteria that causes milk to spoil quickly so the milk will last longer. Milk is homogenized to break down the fat molecules in the milk. If they are not broken down, they will rise to the top and separate as cream. Then the milk is ready to be sold as milk or to be made into dairy products like cheese and yogurt.



testing for safety



packaging



making things, like cheese

3

Distributing

Now the milk has to get to the places people will buy it. Refrigerated trucks will take the products from the plants to grocery stores, food co-ops, and farmers markets.



4

Marketing

Dairy companies use a variety of ways to help people know about their products. They may have commercials on TV or the radio and ads in newspapers and magazines. Many have websites and use internet advertising too. They may also have newsletters and emails they send out to customers. Others will give tastings at grocery stores to encourage people to try their products.



Marketers helped tell consumers about Kemps Dairy at the Minnesota State Fair.

5

Consuming

This might be your favorite part! Once the dairy products are purchased and brought to your home, it is time to eat and drink!



Fun Fact:

99% of all U.S. households buy milk. Americans drink about 25 gallons of milk per person each year. That is **400 glasses of milk!** How many do you think you drink?

Global Markets for Minnesota Agriculture



Just because food is grown in a country doesn't mean it stays there. **Minnesota exports (sells) one-third of our agriculture products!** We import (buy) from other countries too, so world agriculture is important for us here in Minnesota. Why do countries buy and sell ag products from one another?

- Some places have little suitable land to grow food. They may have poor climates, or be on islands, mountains, or deserts. Much of the land may be covered with cities. With limited land and water, they can't grow enough food to feed the people. These places must import.
- Most people enjoy eating foods that don't grow in their area. Did you have a banana or cinnamon toast for breakfast? Did someone drink cocoa,

coffee, or tea? Importing made it possible; these things don't grow here. We use products from other countries, and they use products from us. Food exports and imports bring variety and flavor to our meals.

- The demand for our exports is increasing. In countries where family income is rising, people who can afford more variety welcome our exports (especially meat). Many countries buy our raw commodities for ingredients in their own food. Imported soybeans for tofu or corn for tortillas are examples.

We're not just feeding people, either. Countries growing more livestock need feed (corn, soybeans, etc.) for their animals. In countries where populations are growing rapidly, people need more of everything.

Minnesota agriculture helps keep our state's economy strong! Our top four exports are soybeans, corn, pork, and livestock feed. China is our largest export customer.



Follow the Exports

You may need a Minnesota map and a world map to locate these places. The dots on the Minnesota map mark each of the communities mentioned.



1. Chickens from Worthington are served in a restaurant in Canada. Draw an arrow from Worthington to Canada.

2. Sugar from Moorhead sugarbeets is sold at a German grocery. Draw an arrow from Moorhead to Germany.

3. Rochester pork is served at a wedding in Japan. Draw an arrow from Rochester to Japan.

4. Duluth timber is sold to a Mexican paper mill. Draw an arrow from Duluth to Mexico.



Young boys get ready to help with milking.

Big Changes in Minnesota Agriculture: 1900-1955

Back to Variety

As the 1900s began, most farms were small family farms of an average 170 acres. **Diversified farming** was back. Farmers were raising a variety of crops and livestock instead of one main crop.

Early Technology: New Machines Help Farmers

Cars, trucks, and tractors came on the scene in the 1900s. Imagine the change in a farm family's life! Farm machines slowly replaced animal power and handwork. Timesaving inventions like the combine could cut, thresh, and clean crops in just one pass through the field. Cows could be milked by machine. New inventions helped families farm more land. They could produce more food in less time without as much back-breaking labor.

Dust Bowl Days

The Dust Bowl appeared in the early 1930s. This hard time lasted for more than a decade. The grasses holding soil in place were destroyed by farmers grazing cattle and plowing the plains. When drought and wind came, the soil eroded, and the Great Plains became the Dust Bowl. Tons of dust killed crops and forced people to flee their homes. Many farmers were forced out of business. Farmers learned new ways to save soil. They rotated crops, used strip cropping and contour plowing, and planted trees to protect soil from wind damage.

Solving New Challenges

Three big developments followed the Dust Bowl days: **Hybrid seeds, livestock vaccines, and commercial fertilizers.**

Discuss: Why do you think people were motivated to develop these things? How did each help agriculture – and people?

Crop Protection

After about 1950, scientists developed new **crop protection chemicals** to control weeds, pests, insects, and diseases. That means higher crop yields. Farmers are trained to use these chemicals with great care and caution to protect groundwater, air, soil, animals, and themselves. The challenge continues to find the best ways to feed the world while protecting natural resources.

Land Use: Farms to Cities

Minnesota cropland once stretched as far as the eye could see. That changed as people began leaving farms for urban jobs, and growing towns and cities took more space. By 1950, more Minnesotans lived in cities than on farms for the first time ever. Thousands of acres of farmland were turned into suburban neighborhoods, factories, businesses, public buildings, shopping malls, golf courses, and more.

- Imagine a farm family moving to the city for a new life. How would their lives change?
- What would happen to our food and fiber supplies if everyone moved into towns and cities?
- What happens to rural communities when large numbers of people leave?

For more information about Minnesota's agriculture and farming history, visit www.mnagmag.org/archive.

Early 1900s steel-wheeled tractor with combine.



Wind moves valuable soil from fields, filling ditches and burying fence posts.



Bagging hybrid seed corn, 1945.

By 1954, tractors outnumbered horses and mules. How did having a tractor make a huge difference to a farmer?



Farmlands give way to Twin Cities suburbs.



Photos Courtesy Minnesota Historical Society

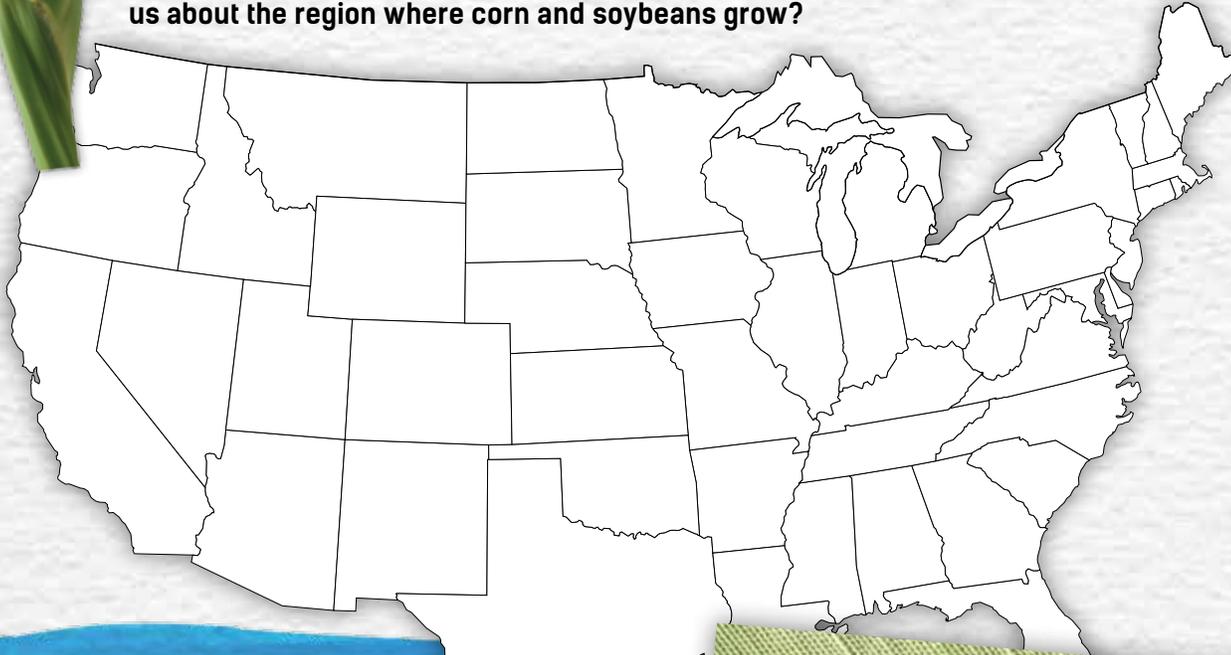
Talking Corn ... and Soybeans



2015 Top Soybean States

1. Iowa
2. Illinois
3. Minnesota
4. Nebraska
5. Indiana
6. Ohio
7. South Dakota
8. North Dakota
9. Missouri
10. Arkansas

Corn and soybeans are important ingredients in feed for dairy cattle as well as pigs, sheep, chickens, turkeys, and many other animals raised on farms. In 2015, Minnesota was third in the nation for soybean production and fourth for corn production. The top ten corn- and soybean-producing states are listed to the right. Label each state using the postal abbreviation. Color the corn states red and the soybean states blue. If a state grows both, use purple. What can you tell us about the region where corn and soybeans grow?



2015 Top Corn States

1. Iowa
2. Illinois
3. Nebraska
4. Minnesota
5. Indiana
6. South Dakota
7. Kansas
8. Ohio
9. Wisconsin
10. Missouri

Thin is In!

Today's pigs are bred and fed to be leaner than the pigs of yesteryear. Compared with pigs from the 1950s, today's slimmer model has 75 percent less fat, thanks to superior genetics and new technologies in hog production. Why? Livestock growers know it's what health-conscious Americans want and will buy. Pleasing the customers keeps their business growing.



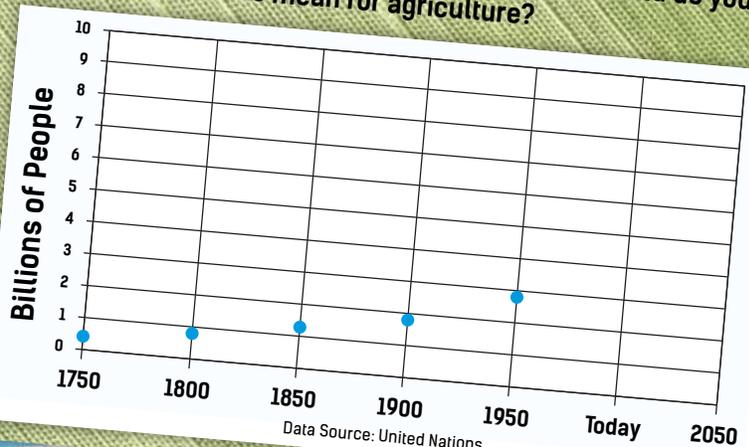
1950



Today

World Population Growth: Connect the Dots

World population today is about 7.3 billion and growing fast. It is expected to reach 9.7 billion by 2050. Add those dots to the graph below, and connect all the dots. What trend do you see? What does this mean for agriculture?



Learn about and order our free educational materials at mn.agclassroom.org.

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