

AgMag

Agriculture: Helping you every day!



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Agriculture, the Land, and You!

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

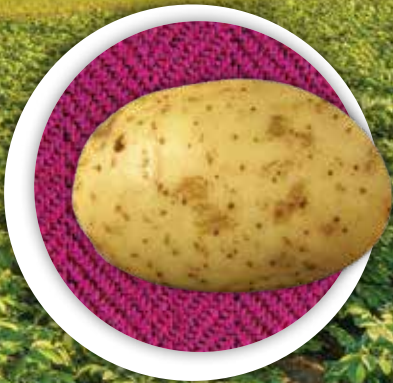
Where would they get food? Wool? Building supplies? Flowers, trees, and shrubs? Farmers are producers of all these things. What would farmers do if there were no consumers to buy these things? What would it be like if each of us had to grow everything we need all by ourselves?

- **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. To do that, farmers use seeds, soil, sunlight, water, fertilizers, vitamins and minerals, and feed. These are the inputs that are needed for farmers to grow produce and animals.
- 2. Processing:** The process of changing the raw materials into outputs 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.

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.



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.

A Tale of Two Kingdoms



Plants

They are the only living things that make their own food. They are also the source of food for every other living thing. Plants become our medicines, fibers, paper products, cosmetics, spices, and building materials. We burn plants for fuels. This includes wood as well as the fossil fuels (coal, petroleum, natural gas) that came from plants eons ago. We eat plants – roots, leaves, stems, and fruits. Finally, we depend on plants for the oxygen we breathe. Without plants, we would not survive.

Animals

Only about one-fifth of the land in the United States is suitable for growing crops. The rest has poor soil, too little rainfall, or rocky, rough surfaces that machinery can't handle. Forests cover millions of acres. Even though we can't grow food crops on these lands, livestock can often graze there. As livestock eat grass, they turn it into food and fiber people can use. Animals provide the eggs, milk, fish, burgers, steaks, chops, and roasts that give us protein. They produce the wool and leather people use for clothes, shoes, and baseball gloves. Animal fats are important in soaps, cleaners, cosmetics, paints, plastics, and much more. Thanks to animals, we have better lives.



Meet the Farmer

Brad & Rochelle Krusemark of Trimont, Minnesota raise both plants and animals on the farm that has been in their family since 1921. They raise corn, soybeans, pigs, and beef cattle. That way they have four different products to sell. It costs a lot of money to buy land, seed, fertilizer, machinery, buildings, and crop protection products. How much they earn on each product can vary from year to year. If a year comes when soybean prices are lower than usual, that can be hard for farmers who grow only soybeans. By raising different plants and animals, the risk can be lowered.

There are different challenges for plants and animals. Farmers who grow plants depend on weather conditions every week. Plants need rain and sunshine to grow. But too much heat will cause severe drought that can cause plants to die. Too much or too little rain will make the plants sick or weak.

Animals require daily care and feed. Farmers care for livestock 365 days a year: no holidays off! Weather can affect animals too. Pigs do not sweat, so living in an environmentally controlled barn on the Krusemark's farm protects them from sunburn and summer heat as well as severe cold.

Word Find

Find each of these words in the puzzle and circle them.

- | | |
|---------|-----------|
| Plants | Fruits |
| Animals | Livestock |
| Fuels | Graze |
| Roots | Protein |
| Stems | Leather |
| Leaves | Fats |

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

Potatoes in the Agriculture System in Minnesota

1

Producing

Potatoes are grown on farms. They are grown in many parts of Minnesota, from the northwest to the southeast.

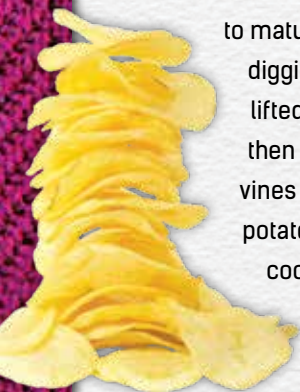


2

Processing

When potatoes reach the desired size, the vines are dried. The potatoes are

left to rest a few weeks in the soil to allow their skin to mature. Mature skin peels off less readily during digging, washing, and handling. Potatoes are lifted from the ground by machines. They are then passed along conveyors that allow soil and vines to fall back onto the field. Different kinds of potatoes have different uses. Some are ready to cook and eat. Others are processed into things like French fries, hash browns, and potato chips. Those go to processing companies that will make these other products.



4

Marketing

Potato and potato-product 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.



3

Distributing

Now the potatoes have to get to the places people will buy them. Trucks will take the products from the plants to grocery stores, food co-ops, convenience stores, and farmers markets. Things like potato chips will be sent to vending machines and other quick-sale locations.



5

Consuming

This might be your favorite part! Once the potato products are purchased and brought to your home, it is time to eat! What is your favorite food from potatoes?



Meet the Scientist

Cari Schmitz Carley is a scientist who researches potatoes at the University of Minnesota. In her work, she breeds potatoes to develop different varieties for Minnesota growers. She does that by collecting pollen and cross-pollinating the potatoes. This helps her develop new varieties that can have higher yields and better processing qualities. They are also more resistant to fungal, bacterial, and insect problems.



So many kinds of potatoes!

There are many different kinds of potatoes. They have different purposes. Some are best for making things like French fries or potato chips. Others are best for directly cooking and eating. In Minnesota, the primary types of potatoes grown are:

- Russets: baked potatoes and French fries
- Red and yellow table potatoes: salads, canning, roasting
- Chipping potatoes: potato chips
- Fingerlings and other specialty potatoes: roasting, salads



Potatoes are classified into different categories based on unique sizes, shapes, and skin attributes. For example, russet potatoes are long and narrow with a rough, netted skin. Yellow and red potatoes have smooth skin and are more ball-shaped.

Different kinds of potatoes also have different sugar content. Potatoes for processing (fried potatoes and potato chips) have to be low in sugar so they do not darken during frying. Potatoes that are not processed, but simply eaten fresh, are sweeter.

When studying potatoes, potato breeders look at more than 40 traits, including potato density, flesh color, quickness to mature, and even eye depth. If a potato's eyes are too deep, the skin will stick inside them.

For potatoes that are going to be made into potato chips, this makes it hard to peel them with a machine. For other potatoes, a deep eye can make the potato unappealing to shoppers at the grocery store.

Fun Fact

The average American eats **134 pounds** of potatoes each year. That's more than **365 potatoes per person per year**—more than one each day!

Potato Math: How Many Potatoes to Plant?

Most potatoes are not grown using seeds. The eyes on a potato are used to grow new plants! Each potato is cut into pieces. Each piece includes an **eye**. These pieces are placed in the soil, four inches deep, with the eye facing up. A new potato plant grows from the eye.



Think Like a Farmer!

Use graph paper and your math skills to figure out how many potatoes to plant.

You would like to plant potatoes in a field that is 66 feet wide and 660 feet long. The area (length x width) of this field is 43,560 square feet, which is equal to one acre. An acre is a common unit used to measure land area on farms.

1. Potatoes are commonly grown in rows. In your field, you would like your rows to go the entire length of 660 feet. If one potato piece is planted every 12 inches, how many potato pieces are planted in one row?
2. There should be 36 inches between potato rows to allow for the plants to grow. How many rows could you fit in a field that is 66 feet wide?
3. Using your answers from questions 1 and 2, how many potato pieces would you need to plant the entire one-acre field?
- a. If we can get 4 potato pieces from one potato, how many total potatoes would be needed to plant the one-acre field?

Going Around in Circles

The agriculture system is part of our market-based economy. People, products, money, services, and other resources are all connected in this market-based economy. A **circular flow** model can be used to show these connections.

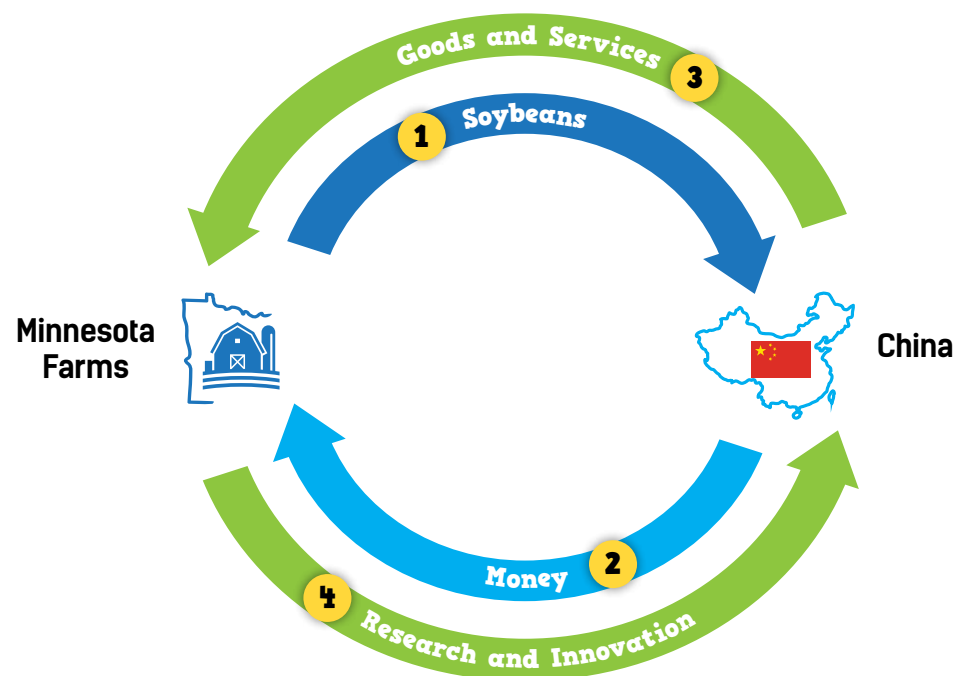
Think of it this way: A person earns money by working as a truck driver. The driver uses the money earned to buy groceries and clothes. The stores he shops at send the money to the farmers and factories that produce the food and clothing. Those companies make more food and clothing. Then they hire trucks to ship it to the stores, so the truck driver continues earning money.

This happens across the world—even starting and ending in Minnesota. For example: Farmers in Minnesota grow soybeans. Then they sell those soybeans to China (1). In return, China pays the Minnesota farmers (2). The farmers use these funds to pay wages to employees and buy other products and services. Some of those products and services come from China (3). Often those products and services can be used by the farmer to develop new and better ways of farming (4). They can become more efficient at growing soybeans, or growing more advanced types of soybeans. (Examples: Soybeans that are higher in protein, soybeans that can survive wet or dry conditions, soybeans that are resistant to pests and disease.) Then those soybeans can be sold to China, and the circle starts again.

Market Economy

A market-based economy is a system where prices for goods and services (supply) depend on how badly people want those goods and services (demand). The prices are not set by the government.

Circular Flow Model: Soybeans



Circular Flow Economics at Home

Think about an agricultural product that your household uses. Examples could be potato chips, ice cream, flour, cereal, and many others! Most likely this product is made into a usable or edible form by a processing company like Old Dutch, Kemps, Pillsbury, or General Mills. Use the circular flow model to show the connections between your household and this company. Be sure to include Work Provided, Wages Paid, Goods Produced, and Money Spent.



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

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

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. 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. Farms that remained grew larger. There are now fewer farms. But the farms that exist are larger than they used to be.

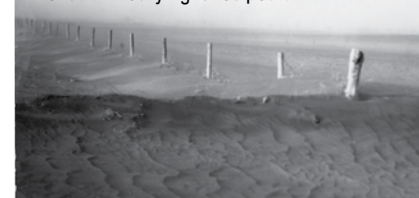
- Imagine a farm family moving to the city for a new life. How would their lives change?
- What would happen to our food and fiber supplies if everyone moved into towns and cities?
- What happens to rural communities when large numbers of people leave?

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.



Talking Corn ... and Soybeans

Corn and soybeans are among Minnesota's top crops. They are used for a wide variety of products, from animal feed to human food to ethanol gas to ink. In 2017, 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?

2017 Top Soybean States

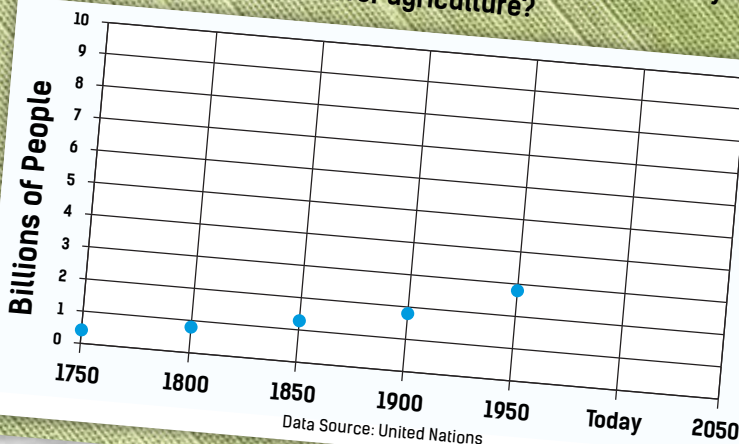
1. Illinois
2. Iowa
3. Minnesota
4. Nebraska
5. Indiana
6. Missouri
7. Ohio
8. South Dakota
9. North Dakota
10. Kansas

2017 Top Corn States

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

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?



Robots - to Pick Strawberries?

Scientists are working on robots that can pick strawberries. Imagine what a large field of strawberry plants would look like with a machine, rather than people, picking the berries. This could be helpful for berry farms that have a hard time hiring enough people to pick the strawberries when they are ripe. But it can also cause challenges. Can you think of some ways that robots would have a harder time picking strawberries than humans do?

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