

# Agriculture's Biggest Leaps (Part I)

American Indians lived in our part of the country long before white settlers arrived and long before statehood. The two major tribes were the Ojibwe (sometimes called Chippewa or Anishinabe) and the Dakota (Sioux). Nature provided everything these early people needed for survival year round. Over time, they became food producers as well as hunters, fishers and gatherers. They planted corn, pumpkins, squash and more. They harvested wild rice growing in northern lakes. They worked hard to get enough food for their own needs. These early farmers did their work by hand in a time before machines were invented.

Agriculture has changed in amazing ways in the years since Indians first farmed the land. What have been the biggest achievements in the past 100 years? Some top agricultural engineers asked themselves that question. They came up with a list that we'll explore in your three AgMags this year.

*Notice huge changes in agriculture when hand labor was replaced by machines and technology.*

## Electricity

In 1935 the Rural Electrification Administration (REA) brought electricity to farming communities. Imagine how farm life changed!

Electricity helped with farm work. Milking, threshing and other farm jobs were done much faster with fewer people. Now homes and barns were lit with electric lights. Farmers no longer ended their workday when the sun went down. Electric water pumps replaced buckets and barrels. These pumps brought fresh, clean well water into barns and houses.



*Cooking on a wood stove with light from kerosene lamps.*

## Milking Machines

Electricity greatly changed dairy farms. Now electric milking machines came on the scene. Instead of one person milking one cow by hand, the farmer could use electric milking machines to milk more cows at one time. This timesaver meant farmers could add more cows to their herds and produce more milk to sell.



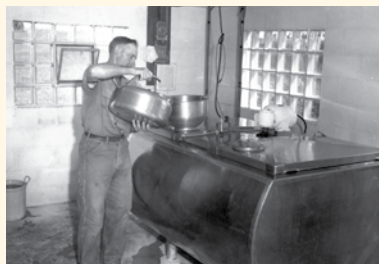
*Farmers carried early milking machines from cow to cow.*

*This robot is the latest in modern milking machines. Milk automatically goes by pipe to a cooling tank. For a neat video about robotic milking go to [www.mda.state.mn.us/kids/agmags.aspx](http://www.mda.state.mn.us/kids/agmags.aspx)*



## Refrigerated Milk Storage

What happens to milk when it's not kept cold? Yes, it quickly spoils. Thanks to electricity, farmers could refrigerate their milk.



*Farmers poured milk into cooling tanks. This kept it fresh until trucks came to haul it to creameries for processing and packaging.*



## Tractors

Tops on the list of ag's 15 biggest achievements in the past 100 years is the gasoline-powered tractor. By 1900 farmers considered tractors and cars their main necessities. Replacing horses with machine power did more to help agriculture move forward than almost anything else. Why? Tractors had more power and more speed. They pulled heavy machines and did more work with fewer people.



*Early tractor.*



*Modern tractor.*

## What Do You Think?

Why was the arrival of electricity so important to farming?

If you had to live your life without electricity or indoor running water, which would you give up? Why? How would your life change?

What recent inventions have made your life easier? What inventions would you like the future to bring?

## Did you know?

In 1800 it took 373 human hours to produce 100 bushels of wheat. By 1987, the year of the first Ag Mag, it took less than three labor hours. What made the difference?

*Learn about more big achievements in agriculture in your next AgMag!*

# Agriculture's Biggest Leaps (Part II)

Agriculture has changed in amazing ways in the years since Indians first farmed the land. What have been the biggest achievements in the past 100 years? Some top agricultural engineers asked themselves that question. They came up with a list that we'll explore in your three AgMags this year. Here's Part Two!

## Conservation Tillage

Today's farmers use conservation tillage to protect soil. In the past, most farmers plowed (turned over) their soil before planting. Plowed soil is bare soil, easily carried away by wind and rain.

Conservation tillage includes disturbing the soil as little as possible. Soil isn't plowed. Stubble (cornstalks or other plant parts) is left on the field after harvest. Stubble holds soil in place and makes it harder for weeds to grow. Planting is no problem. Special machines press new seeds down through the stubble and into the soil below.

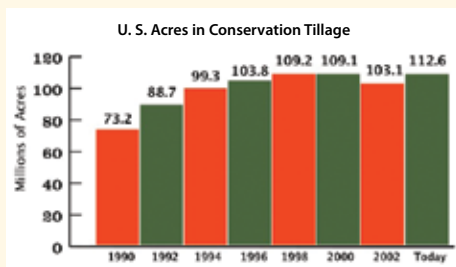
Conservation tillage also saves fuel and labor because gas-powered machinery makes fewer trips over the field.



What happens to the rich topsoil when the wind blows, or when rain flows? In 1982, when most fields were plowed, three billion tons of topsoil were lost.



What's different? What happens to this topsoil in wind or rain? By 2003, many farmers were using conservation tillage. Losses were cut nearly in half (1.7 billion tons). Today about 70% of corn land and almost 100% of soybean land are conservation tillage.



How many millions of acres are in conservation tillage today? How does that compare with 1990? What is the general trend for farmers using conservation tillage?



Tractors can be offices, complete with GPS, computers, cell phones, air conditioning, music systems and more!

## Precision Farming with GPS

Also called **site-specific agriculture**, this new technology is a different way of farming the land. Soils and conditions vary within a field. Site-specific farming is managing areas within fields, rather than farming the same way on the entire field.

A GPS helps farmers know their land better. They can pinpoint locations and measure the soil and other differences within fields. This information helps them know how to best use each area of the field. GPS-guided machinery controls the number of seeds, fertilizer, crop protection chemicals and other things to just the right amounts. Precision farming adds up to better yields.

## Seeding Technology

Farmers know good crops begin with good seeds. What happens when new technology and computers are used to plant precisely the right seeds at just the right depth and space the plants exactly right? To plant more seeds per acre and grow them correctly? Crops get better and better. Here's proof:

In 1980, about 21,000 corn seeds were planted per acre. Today, it's 32,000 seeds or more per acre. How many more plants is that per acre?

Extra plants, computer precision planting, new hybrids and fertilizers all add up to more corn yield for farmers!

## What Do You Think?

Water erosion on U.S. croplands has gone down by more than 40 percent since 1982. How do you think conservation tillage helped? What else might help save soil?

### Did you know?

Planting the same crops in the same soil year after year uses up the soil nutrients. What is **crop rotation**? How do farmers use it to keep soil healthy?

A GPS (global positioning system) is part of everyday life for many of us. Hunters and fishers use GPS. Cars, airplanes, cell phones, wristwatches and golf carts have them. Snowboarders in avalanche country carry transponders that have them. How does a GPS work? Do you use one?



# Agriculture's Biggest Leaps (Part III)

Agriculture has changed in amazing ways in the years since Native Americans first farmed the land. What have been the biggest achievements in the past 100 years? Some top agricultural engineers asked themselves that question. They came up with a list that we've explored in your three AgMags this year. Here's Part Three!

## Electronic Innovations

From computers and monitors to GPS and greenhouse controls, electronics are everywhere in modern agriculture. Computer chips in animal ear tags are one example. Farmers use ear tags to identify and keep information on individual animals. Ear tags come in many different styles and colors, and can be set up to record different kinds of information. The large number on this identification tag is the cow's unique number in the herd; it functions like a name. This number is only used when the animal is on the farm. The 15-digit smaller number and the matching number on the button tag at the top follows the animal even when the animal leaves the farm or country. The first three numbers "840" tell us that the animal is from the United States. The other numbers help further identify where the animal is from.



Farmers can swipe ear tags to track animal blood lines, health, age, vaccinations, milk production, weight and more. When the animal leaves the farm, it can be traced all the way through processing.



## Self-Propelled Combines

Mowers and threshers were good machines, but farmers made several trips across the field to harvest their crops. **Self-propelled combines** came into use in the mid 1900s. They both cut crops and harvest (separate the grains from the stalks) in the same trip across the field. Many combines have changeable heads so they can be used for several different kinds of crops. Wheat, oats, rye, barley, corn and soybeans are all harvested by combines. Combines save time and fuel energy. They help farmers harvest many more acres each day.



## Irrigation

Improving water use could be one of ag's biggest challenges in this century. **Irrigation** (watering the soil) allows crops to grow in places with limited rainfall. Key inventions are center-pivot irrigation and trickle or drip irrigation systems.

Center-pivot irrigation systems (shown above) spray water across large areas of fields without using much water pressure or fuel/energy.

In trickle or drip irrigation, tubes or hoses slowly and steadily deliver water close to the roots of plants. Water is saved because it is applied only where it's needed. Less evaporation also saves water.



## Biofuels

Boosting the amount of fuel we get from renewable resources is a big achievement in agriculture. Fuels made from crops such as corn, sugar cane and soybeans, or from trees and grasses, are called **biofuels**. Biofuels cut air pollution, provide jobs and build new markets for farm crops. Because they come from renewable resources, they help conserve the earth's supply of non-renewable fuel resources like natural gas and oil.

## The Top Six

You've learned about most of the engineers' choices for biggest agriculture achievements in the past 100 years. Can you guess which they thought were most important? Rearrange the letters and discover what topped their list.

1. **ctartro** \_\_\_\_\_
2. **rrlau tniocafilircdeet** \_\_\_\_\_
3. **mbnieoc** \_\_\_\_\_
4. **gnilkim ienhcma** \_\_\_\_\_
5. **octtno ipkcre** \_\_\_\_\_
6. **avtonirescno lialteg** \_\_\_\_\_

Circle the one that is not part of Minnesota agriculture? Why?

## What Do You Think?

What do you think was the biggest need or reason behind each new invention?

It's your turn soon. What would YOU invent to help feed the world or to make farming more efficient?

## Did you know?

Ten percent of the gasoline used in Minnesota contains ethanol made from corn. Ethanol is an early biofuel but others are following. Biofuel comes from other forms of **biomass** as well: the fiber of sticks and trees, prairie grass, wheat straw, sugar cane, paper pulp, rice hulls and more.