Unit A: General Agricultural Machinery

Lesson 2: History of Production Agriculture

Student Learning Objectives:
Instruction in this lesson should result in students achieving the following objectives:
1. Describe agriculture's role in developing civilizations.
2. Identify some of the inventions that changed the agriculture industry.
3. Identify some of the equipment currently used in production agriculture.

Recommended Teaching Time: 1 hour

Recommended Resources: The following resources may be useful in
teaching this lesson:

Bial, Raymond. *Corn Belt Harvest*. Houghton Mifflin, 1991.

Lee, Jasper S., et al. *AgriScience Discovery*. Upper Saddle River, New Jersey: Prentice Hall Interstate, 2003.

Peterson, Chris. *Century Farm*. Boyds Mill Press, 1999.

www.CAT-ag.com
www.ytmag.com/games.htm
www.ytmag.com/kids.htm

List of Equipment, Tools, Supplies, and Facilities:
- Writing surface
- PowerPoint Projector
- PowerPoint Slide
- Transparency Masters
- Copies of student worksheets

Terms: The following terms are presented in this lesson (shown in bold italics and on PowerPoint Slide 2):

- Baler
- Civilization
- Combine
- Drill
- Geographic information system (GIS)
- Global position system (GPS)
- Grain truck
- Horsepower
- Hunters and gatherers
- Internal combustion engine
- Loader
- Planter
- Reaper
- Steel plow
- Stewardship
- Thresher

Interest Approach:

Have students make a list of machines farmers use in production agriculture. Write this list on the chalkboard. Ask the students to describe the job of each machine.

SUMMARY OF CONTENT AND TEACHING STRATEGIES

Objective 1: Describe agriculture's role in developing civilizations.
Anticipated Problem: How does agriculture develop civilizations?

(PowerPoint Slide 3)
  I. A *civilization* is a group of people who settle in one place. In order for a civilization to survive in that place they must have food.
     A. One way to obtain food is by hunting and gathering. If a civilization depends on this method of obtaining food, it must designate members of the group to be *hunters and gatherers*, people who go out and find food for everyone. Eventually, the group will use up all local sources of food or the population will outgrow the supply.

(PowerPoint Slide 4)
     B. Another way to obtain food is to plant, care for, and harvest crops.
        1. Civilizations found that for them to establish a community and remain in the same place, it was necessary to plant food and to tame animals. This was the beginning of agriculture science.

(PowerPoint Slide 5)
        2. As people began planting food and raising animals, they immediately began looking for better ways to care for plants and animals. Through scientific experimentation they began improving the science of agriculture.

(PowerPoint Slide 6)
        3. As people became more dependent on land and animals, they began to practice stewardship. *Stewardship* is the practice of taking care of land and animal resources so they can benefit future generations.

Lead a class discussion and ask students to identify past or present civilizations or countries that used hunting and gathering as their main source of food. Ask students to describe the differences between these civilizations and today's.

Objective 2: Identify some of the inventions that changed the agriculture industry.

Anticipated Problem: What are some of the major inventions that changed the agriculture industry?

(PowerPoint Slide 7)

II. In early agricultural practices, seeds were planted and harvested by hand. Over time a number of inventions and innovations have advanced farming practices to their current state.

(PowerPoint Slide 8)

A. In 1831, Cyrus McCormick invented a mechanical reaper that made harvesting crops more efficient. The **reaper** was a machine pulled by horses that was used to cut wheat at the base of the stem. Prior to the invention, plants had to be cut by hand and bundled into shocks and stacked.

(PowerPoint Slide 9)

B. In 1837, John Deere began manufacturing a plow with a steel cutting edge, called a **steel plow**. This steel plow was light enough that horses could pull it through the ground, while at the same time, it was strong enough to break up heavy prairie soil.

(PowerPoint Slide 10)

C. Soon after McCormick's reaper was invented, a thresher was invented. A **thresher** separates the grain form the stem of the plant. Farmers would pick up the stalks cut by the reaper and then hand-feed them through the thresher. After the invention of the internal combustion engine, these two machines were combined to make the combine.

(PowerPoint Slide 11)

D. An **internal combustion engine** is a device that uses fuel to create energy which is then used to do work. The invention of this engine led to the invention of tractors and combines. Work that once took days to do by hand could now be done in minutes.

Use TM: 2-1 to provide a more complete overview of important dates in the history of agriculture. As a cross curricular activity, have students identify other important historical events that took place at the same time as these agricultural events.

Objective 3: Identify some of the equipment currently used in production agriculture.
Anticipated Problem: What is some of the equipment that is used currently in production agriculture?

(PowerPoint Slide 12)
    III. Powerful, complex equipment is used in today's agricultural industry to increase productivity.
(PowerPoint Slides 13 and 14)
        A. Tractor
            1. A tractor can be used for a number of different jobs around the farm.
            2. Because of their powerful engines and large tires, tractors are able to pull other pieces of machinery through fields.
            3. Before tractors were invented farmers used horses to pull heavy equipment.
            4. *Horsepower* is a measurement for the power of an engine. This word originally meant the number of horses it took to pull machinery.
(PowerPoint Slides 15 and 16)
        B. Combine
            1. A *combine* is a machine used to harvest crops from the field.
            2. A combine is the combination of a reaper and a thresher. The head of the combine runs through the rows and cuts the stalk of the plant. The plant is then pulled through the machine and the grain is separated from the plant material.
(PowerPoint Slides 17 and 18)
        C. Planter or drill
            1. A *planter* or *drill* is an implement used to drop seeds into the ground.
            2. Typically, a planter is used to plant corn or soybeans, and a drill is used to plant soybeans or small grains like wheat or oats.
            3. Seed counters drop the right amount of seed into rows created by the planter.
            4. Before this machine was invented, farmers dug rows and planted the seeds by hand.
(PowerPoint Slides 19 and 20)
        D. Loader
            1. A *loader* is a large scoop or bucket that is placed on the front of a tractor.
            2. This bucket can be used to move large amounts of hay, straw, dirt, gravel, or manure around very quickly.
            3. Before tractors and loaders were invented, farmers hand shoveled, carried, or pushed material that needed to be moved.

(PowerPoint Slides 21 and 22)
       E. Grain truck or wagon
           1. A *grain truck* is a vehicle used to move grain from the field to storage bins or grain elevators.
           2. A combine has a bin behind the cab that stores grain as it moves through the field. When this bin is full, it is unloaded into a grain truck or into a wagon to be taken out of the field.

(PowerPoint Slides 23 and 24)
       F. Baler
           1. A *baler* is a machine used to wrap straw or hay into tight bundles called bales.
           2. The baler is pulled behind a tractor and picks up the hay or straw off the ground. Inside the baler, the hay or straw is tightly packed or wound into round or rectangular bales. When the bale reaches the proper size the machine wraps the bale with wire or twine to secure it.

(PowerPoint Slide 25)
       G. Global Positioning System (GPS)
           1. A *Global Positioning System (GPS)* is a system that uses satellites and computers to tell a farmer his or her exact location on a field.
           2. This technology is so precise it can tell a farmer his or her location within inches.
           3. GPS systems can precisely guide tractors and equipment through a field and program computers to deliver precise amounts of see, fertilizer, or herbicide to plants in variable amounts.

(PowerPoint Slides 26 and 27)
       H. Geographic Information System (GIS)
           1. A *Geographic Information System (GIS)* is a system used with GPS to make maps or grids of a field.
           2. These maps give a farmer data about soil conditions, crop yield, and other information so he or she can make decisions needed to improve the crops in the field.

Use TM: 2-2, TM: 2-3, TM: 2-4, TM: 2-5, TM: 2-6, TM: 2-7, and TM: 2-8 to illustrate the different types of equipment used in agricultural production.

Review/Summary: Use the student learning objectives to summarize the lesson. **(PowerPoint Slide 28)** Have students explain the content associated with each objective. Student responses can be used in determining which objectives need to be reviewed or taught from a different angle. Use observations as the basis for reteaching areas where student mastery may need improvement.

Application: Use WS: 2-1 to reinforce the concepts of the lesson. Classroom discussion of the objectives and student questions will also assist in applying the concepts.

Evaluation: Focus the evaluation of student achievement on mastery of the objectives as stated in the lesson. A written test can also be used to assess student achievement of the objectives. A sample written test is attached.

Answers to WS 2-1 Worksheet:

1. Planter
2. Grain truck
3. Tractor
4. Baler
5. Combine
6. Tractor with loader

Answers to Sample Test:

Matching

1. e
2. b
3. a
4. c
5. d

Fill-in-the-Blank

1. John Deere
2. baler
3. satellites, computers

Short Answer

Answers may vary. Examples include reaper, thresher, steel plow, tractor, or internal combustion engine.

History of Production Agriculture

Name: _____

Matching: *Match each word with the correct definition.*

    a. combine   d. loader
    b. thresher   e. tractor
    c. reaper

_____ 1. Powerful machine used to pull other farm implements.

_____ 2. A machine that separates grain from the stalk.

_____ 3. This machine is a combination of a reaper and thresher.

_____ 4. A machine invented in 1831 by Cyrus McCormick.

_____ 5. Large bucket on the front of a tractor.

Fill-in-the-blank: *Complete the following statements.*

1. _____ _____ was the first person to manufacture the steel plow.

2. A _____ packs hay or straw into tight bales.

3. Global Positioning Systems use _____ and _____ to pinpoint locations within a field.

Short Answer: *Answer the following question.*

What are two major inventions that changed the agriculture industry?

HISTORY OF AGRICULTURE

1731   Jethro Tull introduces the horse-drawn cultivator and seed drill into English farming.

1784   James Small invents the iron plow in England.

1793   Eli Whitney invents the cotton gin.

1797   First cast-iron plow is patented.

1831   Cyrus McCormick invents the reaper.

1834   Plows with steel saw blades begin to be manufactured.

1841   Practical grain drill is patented.

1847   Irrigation methods begin.

1855   The two-horse straddle-row cultivator is patented.

1867   Barbed wire is invented.

1881   Hybrid corn is produced, greatly increasing corn production.

1884   Horse-drawn combines are used.

1927   All-purpose, rubber-tired tractor with complimentary machinery is used.

1970s   Minimum tillage agriculture is popularized.

1994   Farmers begin using Global Positioning Systems (GPS) to track and plan their farming practices.

TRACTOR

Tractors do many jobs on a farm. Because of their powerful engines, they are mostly used to pull heavy machines like plows and planters. Their large tires provide traction.

COMBINE

A combine is a machine that picks crops from the field and separates the grain from the stems, cobs, or pods. The grain is then stored in a large bin behind the cab. When the bin is full, the auger, or arm, on the side of the combine moves the grain from the combine into a grain truck or wagon.

PLANTER

The planter places seeds into the ground as a tractor pulls it through the field. The seeds are loaded into tanks on the planter. The machine creates a row and drops the seed in the row. The seed is then covered with a layer of soil.

TRACTOR WITH LOADER

The loader is a scoop or bucket located on the front of a tractor that is used like a large shovel. It helps farmers move hay, straw, gravel, dirt, and manure around the farm.

TM: 2-6

GRAIN TRUCK AND WAGON

Farmers use grain trucks and wagons to move grain from the field to grain bins or the grain elevator.
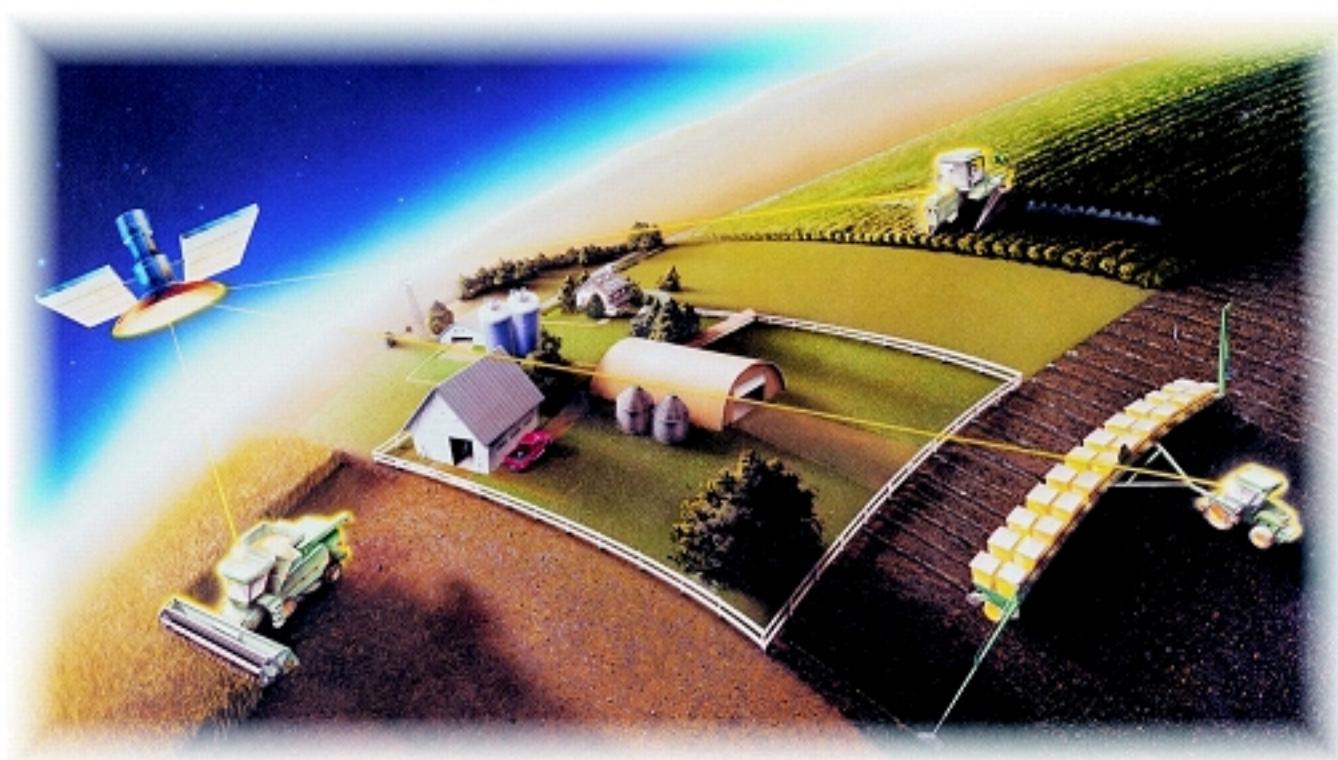
BALER

A baler is used to wrap hay or straw into round or rectangular bales. The baler packs the hay or straw tightly and ties it together with wire or twine.

GLOBAL POSITIONING SYSTEM & GEOGRAPHIC INFORMATION SYSTEM

GPS works through satellites and computers in the tractor to pinpoint exact location. GIS is then used to make a grid for each field to tell farmers how to prepare and maintain the soil and crops in that field.

NAME THE EQUIPMENT

Directions: Write the name of the piece of equipment on the line under its photo.

1. _____

2. _____

3. _____

4. _____

5. _____

6. _____