

Why Agriculture?

Teaching about agriculture in Iowa is an ideal way for students to learn what their state is all about and provide real-life connections to science, math, and social studies concepts. Agriculture is a topic that students can easily connect to because they encounter it often. Who doesn't enjoy talking about food? Nearly everything we eat, wear, use -- even the fuel that powers the cars and buses we ride in -- comes from plants and animals grown on farms. Agriculture provides perfect real-world connections to STEM and makes learning relevant to students.

Helping students understand the farm-to-table connection is important in our consumer-driven society. Teaching students to be agriculturally literate connects their learning to everyday life. That is what the *Iowa Ag Today* series is all about.

About Iowa Ag Today

Iowa Ag Today is a great supplement to your science, social studies, and language arts curriculum. Each issue is chock-full of discussion topics, new vocabulary, and other materials that you can easily integrate into lessons. Major highlights of each issue include:

Issue 1: Agriculture is Everywhere

- What is agriculture?
- Iowa agriculture crops, livestock, & products
- Agricultural careers

Issue 2: Food, Health & Lifestyle

- Nutrition
- Food safety

Issue 3: Agriculture and the Environment

- Natural resource management
- Agriculture in global ecosystems

Issue 4: Culture, Society, Economy & Geography

- Agriculture and the development of civilizations
- Iowa's agriculture innovators
- Geography, global trade and economics

Issue 5: Science, Technology, Engineering & Math

- Science and technology to increase food production
- Safe, healthy, abundant food
- Sustainable systems for a growing population

Issue 6: Plants & Animals for Food, Fiber & Energy

- Domestication of plants and animals
- Renewable and non-renewable resources
- Plant and animal needs
- Biotechnology

Integration Ideas

- After reading the cover story about the challenge of feeding a growing population, give students 2-3 minutes to write their thoughts about what they read. Working in small groups, have students pass their response to a classmate to respond to the text again or respond to what was written. After students have had a chance to respond to each of the group member's papers, have them discuss their papers and responses.
- Practice close reading with "Problem Solved" on page 8 by reading the article multiple times, make "thinking tracks" in the margin, and discussing the text with others.
- Ask students to interview a farmer or someone from a local agriculture business to learn more about how they use science, technology, engineering, and math in their jobs.
- As a class, identify a problem and brainstorm ways technology could be used to help that problem. Problems could relate to farming efficiency, the environment, nutrition, or other agricultural issues. Working in small groups, design solutions, compare, and improve designs.

Alignment with Standards and Lexile

Subject	Code	Standard Lexile Measure = 760L
		Essential Concept or Skill/Standard
Science	4-PS3-4	Apply scientific ideas to design, test, and refine a device that converts energy from one form to another.
Science	4-LS1-1	Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.
Science	4-ESS3-1	Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment.
Science	3-5-ETS1-1	Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost
Science	3-5-ETS1-2	Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.
Social Studies	SS.4.25	Analyze the impact of technological changes in Iowa, across time and place.
Social Studies	SS.4.26	Explain how Iowa's agriculture has changed over time.

Glossary

Some words in *Ag Today* may be unfamiliar to your students. These words often appear in bold type. Many are defined in the articles. Words you might wish to review with your students after reading the magazine are: **science, technology, engineering, biogas, math, sustainable, economic, greenhouse gas** (pg. 1), **candle, sonic sound, innovation, cuts, biodegradable, grafting** (pg. 2), **nutrients, depleted, fertilizer, macronutrients, byproduct, manure, inject, bio-renewable** (pg. 3), **head, feeder, threshing area, sieves, grain tank, auger, chaff, spreader** (pg. 4-5), **genetics, cells, DNA, traits, selecting, hybrids, cross breeding, artificial selection** (pg. 6), **robotic dairy** (pg. 7), **monoslope, hoop building, genetic engineering, insecticides** (pg. 8).

Discussion Prompters

Cover (STEM)

1. How many people live in your community? How many people live in Iowa? (3.107 million) How many people live in the United States? (318.9 million)
2. How has farming changed over the last 50 years? Over the last 100 years?
(Agriculture is much more efficient. There is more science, more technology. We produce more food with fewer inputs.)
3. What does sustainability mean?
(Meeting economic, social, and environmental needs.)

Student Page 2 (Food!)

1. Why is it important to sort food? (Good fruit can be shipped easier. It is also easier to sell in grocery stores. Mechanical sorting is quick and efficient.)
2. Why do we candle eggs? (quality assurance check. In the past it was to ensure that the eggs weren't fertilized.)
3. How can we reduce waste? (buy in bulk, buy large cuts, reuse packages, use biodegradable material)
4. What is grafting? (tissue like branches or buds from one tree are implanted onto another tree.)

Student Page 3 (Crop yields)

1. What are the essential macronutrients for plant growth? (nitrogen, phosphorus, potassium, calcium, magnesium, and sulfur) What other elements or micronutrients do plants need? (iron, manganese, boron, molybdenum, copper, zinc, chlorine, nickel, hydrogen, carbon, and oxygen)
2. What other byproducts do we get from cattle? (clothing, shoes, footballs, furniture, crayons, lipstick, gelatin, glue, soap, medicine, and more!)

Student Pages 4 and 5 (Tools of the Trade)

1. Can you find something that made the job of picking and husking ears of corn easier? (a corn-husking glove. The glove is worn on the hand and strapped around the wrist. The hook tears the husk off and picks the ear from the stalk.)
2. What tool could be used to cut down whole corn stalks? (corn knife. A broad, blunt blade to break the thick corn stalks.)
3. What tool helps remove the corn kernels from the cob? (corn sheller. The hand crank turns a set of teeth that jostle the kernels from the cob.)

Student Page 6 (GMOs)

1. What traits did you get from your mom? What traits from your dad? (eye color, hair, height, sex, skin color)
2. How has cross breeding changed crops like corn? (Corn evolved from an ancient plant called teosinte. Teosinte had 8 to 14 kernels. Modern corn has 400 to 600 kernels per ear.)

Student Page 7 (Robots)

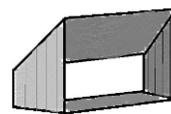
1. How can robots help in agriculture production? (Raising animals takes a lot of time. Dairy cows need to be milked two or three times a day. Robots can automate the process and requires less manpower.)
2. Can you think of examples of robotics that improve speed, increase accuracy, lower costs, reduce injury? (ATVs are quicker than horses, GPS increases accuracy planting seeds and driving tractors, automatic temperature control can lower costs and keep animals comfortable, electronic eyes can sense obstructions and reduce risk of injury.)

Student Page 8 (Land and water)

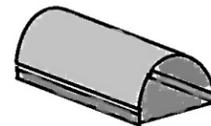
1. What are the advantages of raising animals indoors? (protect from predators, ease of care, maintain cleanliness, control temperatures.) What are the disadvantages? (cost of building, manure management issues)
2. If there are 7.4 billion people on Earth, how many more people will we have to feed in 2050 when the population is 9.7 billion people? (2.3 billion people)

Show what you know - Key

1. Nitrogen (N), phosphorus (P), and potassium (K)
2. 2.3 billion
3. A measurement of land that is about the size of a football field
4. Iowa
5. True. They can be used to milk cows, clean pens, or feed cows.
6. Native Americans harvested corn by hand. Later farmers used simple tools and horses.
7. With combines
8. Economic, social, and environmental
9. Improve speed, increase accuracy, lower costs, and reduce risk of injury
- 10.



Monoslope Barn



Hoop Barn

Name: _____

Check one:

Pretest

Post-test

Show what you know!

Take this short quiz before you read Ag Today, then again after reading the magazine. See the improvement!

1.

What are the three main nutrients that plants need?

2.

By the end of the year 2050, we may have as many as 9.7 billion people on Earth! Today we have 7.4 billion. Calculate the growth from today until 2050. Show your thinking process.

3.

What is an acre?

4.

Which state produces the most eggs? _____

5.

True or False: Robots make dairy farming easier. What is your evidence for your answer?

6.

How did early farmers in Iowa harvest corn?

7.

How do farmers harvest corn today?

8.

What are the three types of needs that should be met for something to be sustainable?

9.

List two benefits to using robotics and machines.

10.

Draw a monoslope barn and a hoop barn.



Name: _____

STEM Challenge: Farming in the Future

One hundred years ago, farmers planted and harvested crops with simple tools. Today, farmers use large machines. Imagine how farming will change in the next 100 years.

Your Challenge: Pick one fruit, vegetable, or grain. How will it be grown 100 years from now? What tools, machines, and technology will farmers use? It will be helpful to research how it is grown today. Then brainstorm ideas for how it can be improved. Think about how the crop is planted, pruned, pollinated, harvested, cleaned, and transported.

Crop: _____

In the space below, describe how farmers might grow this crop in the future. Consider how technology can make work easier, faster, and safer while conserving resources too!