

Your Future in Agriculture

Objective

Students will explore and research a variety of careers in agriculture. Students will read about rapid advances in agriculture now and in American history.

Background

Production farming and ranching are the backbone of agriculture. But behind the farmer and rancher are people in many different kinds of work providing support for those who produce our food and fiber. There are the truckers who drive the products to processing plants. There are people who work in the processing plants, turning crops into products to be sold in the grocery store. There are the grocers and the people who run warehouses where the products are stored.

Even before the farmer gets to work, there are scientists and engineers in many fields doing the research needed to produce the best crops, provide the best care for farm animals, provide the best equipment and more.

There are careers in agriculture for all education levels and all interests, for those who want to work outdoors and those who prefer working inside, at a computer, for those who like working with their hands and those who enjoy research, for those who like working with people and those who prefer working alone. You don't have to have a college degree for many of the rewarding careers in agriculture. Some require just a high school degree or a two-year associate degree.

If you like math, you might consider a career in agricultural finance. Farmers and ranchers need basic math knowledge as well, to keep track of their herds, crops and their finances.

If you like science, agricultural research might be the career for you. Agricultural research covers every area of scientific research, from biology to earth science, to physics and more.

If you like social studies, you might get involved in public policy related to agriculture or you might pursue geography and the exciting field of geospatial positioning systems.

There are even careers in agriculture for those whose favorite subjects are art or English. Artists are needed to design packaging and promotional materials. Writers are needed to communicate the advantages of different products or to keep the public informed about our food system.

The possibilities are endless and are changing rapidly. Preparing for any career means acquiring knowledge in a broad range of school subjects. Most careers require effective communication, including speaking and writing. Most careers require knowledge of basic math and scientific principles.

In addition to knowledge gained through the classroom, skills are also important for achieving success. Working with other people may not be a subject

Oklahoma Academic Standards

GRADE 6

Reading and Writing
Process: R.1,2,3. Critical
Reading and Writing: R.1,2.
Research: R.1,2,3; W.1,2,3

GRADE 7

Reading and Writing
Process: R.1,2,3. Critical
Reading and Writing: R.1,2.
Research: R.1,2,3; W.1,2,3

GRADE 8

Reading and Writing
Process: R.1,2,3. Critical
Reading and Writing: R.1,2.
Research: R.1,2,3; W.1,2,3

HIGH SCHOOL

Reading and Writing
Process: R.1,2,3. Critical
Reading and Writing: R.1,2.
Research: R.1,2,3; W.1,2,3

Online Resources

Some Careers in Agriculture, Oklahoma Ag in the Classroom, <http://www.clover.okstate.edu/fourh/aitc/lessons/extras/careers/index.html>

Careers in Agriculture, Georgia Agriculture Education, http://www.gaaged.org/Careers_in_Agriculture/

Education Portal, http://education-portal.com/article_directory/q_p/page/Agriculture/q_p/Careers_and_Occupations_List.html

Virginia Career View, <http://vacareerview.org/68/careersq/career-search/results> (shows estimated salary)

“Your Dream Career in Agriculture” <http://www.youtube.com/watch?v=ThVKgw8XDN>

Ag in Your Community

Invite representatives from a few of the career areas in agriculture listed to come to your class and describe their work, how they prepared, etc. Students will prepare questions ahead of time and write short reports.

for classroom study, but it is essential in the working world. Everyone has different skills. There are some things you do better than your friends and some things they do better than you. Skills employers want include the ability to multi-task, the ability to communicate, the ability to work with others, the ability to work with computers, and skills specific to the job.

Albert Einstein said “Education is not the learning of facts. It’s rather the training of the mind to think.” This is true of training for your career. Because everything is changing so quickly, the best preparation is learning how to learn and how to find the information you need when you need it.

Procedures

1. Read and discuss background and vocabulary.
2. Provide copies of the two reading pages about advances in agriculture.
 - Students will read them individually or in groups.
 - Students will answer the comprehension questions.
 - As a class discuss the rapid changes in agriculture and the need for flexibility in career planning.
3. Students will complete the “I Would Like to...” questionnaire included with this lesson.
 - Students will determine their preferred career areas based on the largest number of items they have checked.
 - Students will select a career in their preferred career area from the list of careers in agriculture included with this lesson.
 - Students will use online resources to research the preferred career. A list of links to information about careers in agriculture has been provided. Students will find as much information as possible about the career, including education and training needed, potential employers (public or private), kind of work, salary range, etc.
 - Students will write short reports about the careers and make presentations to the class by taking on the persona of a person in the career they have researched. Students may use props, such as lab coats, etc., and describe a few of their duties, education, etc. Students will work in career groups to make their presentations
4. Review guidelines for writing a resume.
 - Students will write resumes to apply for at least three of the jobs within their preferred career area.

Additional Reading

Devantier, Alecia T., and Carol Ann Turkington, *Extraordinary Jobs in Agriculture and Nature*, Ferguson, 2006.

Gillman, Scott, *Food, Agriculture and Natural Resources (Top Careers in Two Years)*.

Jango-Cohen, Judith, *The History of Food (Major Inventions Through History), 21st Century*, 2005.

Johanson, Paula, *Jobs in Sustainable Agriculture*, Rosen, 2010.

Orr, Tamra B., *Organic Farmer (Cool Careers)*, Cherry Lake, 2009.

Owen, Ruth, *Growing and Eating Green: Careers in Farming, Marketing and Producing Food (Green-Collar Careers)*, Crabtree, 2009

Somervill, Barbara A., *Food Scientist (Cool Careers)*, Cherry Lake, 2009.

Vocabulary

agriculture— the science or occupation of cultivating the soil, producing crops, and raising livestock

career— a profession followed as a permanent occupation

combine— a machine that harvests, threshes, and cleans grain while moving over a field

commercial— designed mainly for profit

communication— transmission of information so that it is satisfactorily received or understood

crop— a plant or animal or plant or animal product that can be grown and harvested

engineering— the art or science of making practical application of the knowledge of pure sciences, as physics or chemistry, as in the construction of engines, bridges, buildings, etc.

farming—raising crops or animals

finance—the system that includes the circulation of money, the providing of banks and credit, and the making of investments

geography— a science that deals with the location of living and nonliving things on earth and the way they affect one another

government—in the US, the system of people, laws and officials that define and control a city, county, state or the country

hectare— a unit of land measure equal to 2.471 acres

husker—something used to strip the usually thin dry outer covering of barley or corn

incubator— a piece of equipment providing suitable conditions (as of warmth and moisture) for hatching eggs

job— a position at which one regularly works for pay

labor— the services performed by workers for wages

manufacturing— to make from raw materials by hand or by machinery

multitask—the ability to do more than one thing at a time

policy— a course of action chosen in order to guide people in making decisions

private— not under public control

processing—changing or preparing by special treatment

production— the act of bringing something out by work

promotional— helping increase the sales of something

public— relating to or engaged in the service of the community or nation

ranching—working on a a place for the raising of livestock (as cattle, horses, or sheep) on range

reaper—a machine for cutting grain or clearing a field

research— careful study and investigation for the purpose of discovering and explaining new knowledge

revolution— a sudden, extreme, or complete change

sickle— a tool with a sharp curved metal blade and a short handle used to cut grass

skill— a developed or acquired ability

subsistence— the minimum (as of food and shelter) necessary to support life

threshing— separating seed from a harvested plant especially by using a machine or tool

A Revolution in Agriculture

The revolution in agriculture – paralleling that in manufacturing after the Civil War – involved a shift from hand labor to machine farming, and from subsistence to commercial agriculture.... The farmer of 1800, using a hand sickle, could hope to cut a fifth of a hectare of wheat a day. With the cradle, 30 years later, he might cut four-fifths. In 1840 Cyrus McCormick performed a miracle by cutting from two to two-and-a-half hectares a day with the reaper, a machine he had been developing for nearly 10 years. He headed west to the young prairie town of Chicago, where he set up a factory – and by 1860 sold a quarter of a million reapers.

Other farm machines were developed in rapid succession: the automatic wire binder, the threshing machine, and the reaper-thresher or combine. Mechanical planters, cutters, huskers, and shellers appeared, as did cream separators, manure spreaders, potato planters, hay driers, poultry incubators, and a hundred other inventions.

Scarcely less important than machinery in the agricultural revolution was science. In 1862 the Morrill Land Grant College Act allotted public land to each state for the establishment of agricultural and industrial colleges. These were to serve both as educational institutions and as centers for research in scientific farming. Congress subsequently appropriated funds for the creation of agricultural experiment stations throughout the country and granted funds directly to the Department of Agriculture for research purposes. By the beginning of the new century, scientists throughout the United States were at work on a wide variety of agricultural projects.

One of these scientists, Mark Carleton, traveled for the Department of Agriculture to Russia. There he found and exported to his homeland the rust- and drought-resistant winter wheat that now accounts for more than half the U.S. wheat crop. Another scientist, Marion Dorset, conquered the dreaded hog cholera, while still another, George Mohler, helped prevent hoof-and-mouth disease. From North Africa, one researcher brought back Kaffir corn; from Turkestan, another imported the yellow-flowering alfalfa. Luther Burbank in California produced scores of new fruits and vegetables; in Wisconsin, Stephen Babcock devised a test for determining the butterfat content of milk; at Tuskegee Institute in Alabama, the African-American scientist George Washington Carver found hundreds of new uses for the peanut, sweet potato, and soybean.

Excerpt from “Outline of US History,” Bureau of International Information Programs, US Department of State, 2011 (p. 160-177). http://photos.state.gov/libraries/amgov/30145/publications-english/history_outline.pdf

COMPREHENSION QUESTIONS

1. What is the main idea of this article? What are some of the supporting details?
2. What is the author’s point of view? How is it conveyed?
3. List some examples from the article of the importance of research.
4. What was Cyrus McCormick’s “miracle?” Why was it called a miracle?
5. Identify at least five agricultural careers related to the information in this article

Technological Advances Changing Agriculture Industry

...At the Illinois State University experimental farms, Agriculture Department Chair Rob Rhykerd stands in the livestock barn looking at cattle and sheep. A serious drought this year has hurt farm productivity, but Rhykerd said this year's reduced crop would be the envy of farmers a generation ago.

"Yields of corn here in central Illinois right after World War II probably looking in the 50 to 80 bushel per acre range and now an average year in McLean County is around 180 bushels per acre, so more than doubled production in the last 50 years," Rhykerd said....

"We've gone from traditional hybrids into genetically modified crops," he said. "We've improved our efficiency using fertilizers. That has been a major advancement. We've gotten much better in the last 50 years conserving our resources, soil in particular, but also water."

Combines have changed a lot over the year. They have ballooned from harvesting two or four rows to sixteen and planters now put in 48 rows of seeds at a pass. Use of GPS and yield monitors to measure productivity is standard.

A decade ago the buzz term was "precision farming." ISU Agriculture Professor Dick Steffen said that has been slower to develop than originally envisioned. Like all information technology pursuits, it is tough to get each piece of equipment to interface with the others. Steffen said true interactive precision is closer to reality now. Cameras [or sensors] on booms can allow a computer to distinguish weeds from crops.

"So that as it goes along through the field if it spots a weed, it activates the spray nozzle just where the weed is rather than spraying the whole field," Steffen said.

Steffen said what amounts to robotic farming is coming.

"There are a number of pieces of equipment around the country in research labs and in trials where they have taken operators out of the loop, and the equipment operates basically autonomously," Steffen said.

"One of the major equipment companies is looking at using drones [unmanned aerial vehicles, or UAVs] flying over fields," farmer John Reifsteck said....Reifsteck said there may eventually be sensors on those drones to detect weeds, insects, or disease pressure....

Reifsteck said the pace of technology change is not slowing, especially the area of plant genetics....The base genetics of crops are changing to allow higher yields. At the same time, scientists are adding traits for insect protection, weed control, the ability to grow in hot, dry, wet, and cool places....

In a way, the present era is bringing farming full circle from the 19th century. ISU Ag Professor Dick Steffen said when small farmers had a lot of time on horse drawn implements, they knew their land intimately, by the inch. As farm sizes grew, farmers made choices for their entire operation.

"And now with this equipment that allows us to map and allows us to record data about a lot of different points, we are at the point that we can go back to that level of management we saw a century ago," Steffen said.

Excerpted from Schlenker, Charlie, *Illinois Public Media News*, October 2, 2012, <http://will.illinois.edu/news/story/technological-advances-changing-agriculture-industry>

COMPREHENSION QUESTIONS

1. What is the main idea of this article? What are the supporting details?
2. Compare agriculture as described in the article "A Revolution in Agriculture" with agriculture as described above.
3. Contrast the author's point of view with the author's point of view in "A Revolution in Agriculture."
4. List five technological advances that are described in the article.
5. Identify five agricultural careers related to the information in the article.

I would like to...

Based on your personal goals and preferences, put a check mark next to all the phrases below that would accurately complete the sentence "I would like to..." Then count the number of check marks in each category and write the number in the space provided for each group on the next page. This is your preferred career area.

GROUP 1

- work on a farm
- work outdoors
- work with animals
- manage my own business

TOTAL FOR GROUP 1 _____

GROUP 2

- teach others about agriculture, food and the environment
- coach young people
- teach kids how to take care of animals
- teach others to garden and grow crops

TOTAL FOR GROUP 2 _____

GROUP 3

- work in a laboratory
- develop new food products
- develop new biofuels
- solve problems

TOTAL FOR GROUP 3 _____

GROUP 4

- help people with legal problems
- fight forest or range fires
- patrol forest lands
- help keep our food safe

TOTAL FOR GROUP 4 _____

GROUP 5

- work with my hands and tools
- build things
- work on machinery
- design machinery and invent things

TOTAL FOR GROUP 5 _____

GROUP 6

- use a computer to create art
- make movies
- write or broadcast news stories
- take pictures

TOTAL FOR GROUP 6 _____

GROUP 7

- cook meals
- help customers
- take care of lawns and landscaping
- take care of animals

TOTAL FOR GROUP 7 _____

GROUP 8

- work with trees
- work outdoors
- help the environment
- work with wildlife

TOTAL FOR GROUP 8 _____

GROUP 9

- sell things
- work in an office or a bank
- manage a business
- work in a store

TOTAL FOR GROUP 9 _____

GROUP 10

- work with computers
- design computer programs and applications
- write code
- work with geospatial positioning systems (GPS)

TOTAL FOR GROUP 10 _____

Some Careers in Agriculture

Select one of the careers below from the preferred career area as you selected on the “I would like to...” page. Use online resources to find as much information as possible about the career, including education and training required, most likely employer (public or private), kind of work, salary range, etc.

1. PRODUCTION AGRICULTURE _____

- Crop Farmer
- Dairy Farmer
- Rancher
- Farm Laborer

2. AGRICULTURAL EDUCATION _____

- High School Agriculture Teacher
- University Agriculture Teacher
- County Cooperative Extension Service Educator
- Environmental Educator

3. AGRICULTURAL RESEARCH _____

- Plant or Soil Scientist
- Animal Scientist
- Food Scientist and Technologist
- Laboratory Manager

4. GOVERNMENT/LEGAL _____

- Agricultural Grader
- Food Inspector
- Patent Attorney
- Law Enforcement

5. MANUFACTURING/ENGINEERING/ CONSTRUCTION/MECHANICS _____

- Agricultural Machinery Mechanic
- Custom Equipment Operator
- Feed Mill Equipment Operator
- Mechanical Engineer

6. AGRICULTURAL COMMUNICATION/ART/ DESIGN _____

- Agricultural Journalist
- Packaging Designer
- Marketing Communications Manager
- Social Media Specialist and Web Designer

7. SOCIAL AND PERSONAL SERVICES _____

- Gardener or Groundskeeper
- Dietitian
- Veterinarian
- Cook or Restaurant Manager

8. NATURAL SCIENCE AND RESOURCE MANAGEMENT _____

- Entomologist
- Forester
- Hydrologist
- Timber Manager

9. AGRICULTURAL FINANCE, BUSINESS AND MANAGEMENT _____

- Agricultural Equipment Salesperson
- Farm Loan Officer
- Farm Manager
- Truck Driver

10. INFORMATION TECHNOLOGY (COMPUTERS) _____

- Computer Programmer
- Computer Software Engineer
- Computer Hardware Engineer
- Precision Agriculture Technician (GPS)