

AGRICULTURE THE SCIENCE OF FARMING

Employment* in Agriculture, Food, & Related Industries 2019
22.2 Million Jobs (10.9% of U.S. Employment)



*Full & part-time jobs. Categories may not sum to total due to rounding. Source: USDA Economic Research Service using data from U.S. Department of Commerce, Bureau of Economic Analysis, data as of Sept. 24, 2020.

Agriculture, or farming, is the science of cultivating soil, producing crops, and raising livestock. It is the nation's largest employer, with over 22 million people working in over 250 career areas. This is almost 11 percent of total jobs in the United States! However, only about one percent of the U.S. population claim farming as their occupation. The remaining jobs in agriculture can be divided into seven areas: plant sciences, animal sciences, agricultural mechanics, agricultural business, environmental services, food science, and natural resources.

Source: <https://www.ers.usda.gov/data-products/ag-and-food-statistics-charting-the-essentials/ag-and-food-sectors-and-the-economy/>

ILLINOIS + AGRICULTURE = A GREAT COMBINATION

Approximately 75% of the land in Illinois is dedicated to agriculture on about 72,000 farms. There are almost one million agriculture-related jobs in Illinois, which is over 13% of employees in the state. Food and agriculture product-processing contribute significantly to the state's economy. Illinois is one of the top-ranking states in meat packing, soybean processing, dairy manufacturing, corn processing, feed milling, and vegetable processing. The state's fertile soil, favorable climate, availability of good transportation, and extensive industry make it one of the top agricultural states in the nation.



EDUCATION VOCABULARY

HIGH SCHOOL DIPLOMA: certificate of graduation awarded after completing high school.

ASSOCIATE DEGREE: degree given to a student who has completed two years of study at a junior college, community college, college, or university.

BACHELOR'S DEGREE: degree given to a student after completing undergraduate studies that usually last four years.

MASTER'S DEGREE: degree given to a student after completing one or two years of additional study following a bachelor's degree.

DOCTORATE DEGREE: also called a PhD, typically the highest formal degree given to a student after completing additional study following a master's degree.

CERTIFICATION: formal papers showing completion of a test or procedure, or the reaching of a certain level of achievement, in a particular subject.

CAREER VOCABULARY

CAREER: a job or profession that someone does for a long period of their life.

ECONOMY: a system of making and trading things of value.

ECONOMICS: a social science that deals with the production, distribution, and consumption of goods and services.

OCCUPATION: the work that a person does, especially as a way of earning a living.

PROFESSIONAL: anyone who earns their living from performing an activity that requires a certain level of education, skill, or training.



CAREERS IN AGRICULTURE

PLANT SCIENCE



Plant Science, or botany, is a branch of biology that deals with the study of plants, including their growth, structure, properties, processes, classification, diseases, and environmental interactions. The science of botany dates back to Europe in the 16th century, when physicians observed plants in an effort to identify those that would be useful in medicine. Since then, plants have become the source of many products, such as food, perfumes, dyes, beverages, clothing, and medications, among others.

Career Paths: Agronomy Sales, Custom Applicator, Entomologist, Golf Course Superintendent, Horticulturalist, Landscape Designer, Plant Breeder, Soil Scientist

Kacie Athey | Specialty Crops Entomologist
University of Illinois Urbana-Champaign | Champaign, IL

Describe your job.

I am an assistant professor of specialty crops entomology and an extension specialist. I research sustainable pest control methods in crops like tomatoes, apples, and pumpkins. I study beneficial insects and how we can use them to help control vegetable and fruit pests. As an extension specialist, I also work closely with growers and give advice on pest issues they encounter. In addition to my research and extension duties, I get to teach new crop sciences students about bugs and hopefully get them excited and interested in learning more about the science of insects.

How did you become interested in pursuing this career?

I always liked bugs, but I do not think I had really considered it for a career until high school and I was lucky enough to take a biology class where the teacher assigned an insect collection. It got me thinking about what a career working with bugs might look like. College sealed the deal for me when I started working in an entomology lab and was able to do my own independent research and I knew it was the job for me.

What do you enjoy most about your job?

I get to do so many different things in my job. I have worked in a wide variety of cropping systems, from corn, to cotton, to apples and several in between. I have been part of research projects in Australia, Greenland, Spain, Italy, and of course the US. It seems like no two projects are the same and there is always something new to learn. I also really like working with and mentoring students. It is a lot of fun to see people grow in their love of bugs and science.

What school subjects helped prepare you for this job?

Biology and Chemistry for sure. But also, English and writing classes. Science is so much more writing than I really expected when I first started out. Other things that help you prepare for a job like mine are management and business classes.

How are jobs like yours important to the agriculture industry?

My job is directly tied to the specialty crops industry. My research deals with problems that growers in Illinois are having and I try to solve them. When a new insect issue pops up, the growers come to me and I either find a solution by seeking out information that is already out there or by designing experiments to test new techniques to solve insect issues.

ANIMAL SCIENCE



Animal Science is the science of domesticating animals of both the livestock and companion varieties. This includes beef cattle, dairy cattle, horses, poultry, sheep, and swine, as well as dogs, cats, and many others. Professionals in this field are concerned with the nutrition, care, health, and well-being of the animals. They also work in the areas of animal production, breeding, and disease control, as well as the marketing, processing, and distribution of animals and animal products such as meat, dairy products, and eggs.

Career Paths: Animal Caretaker, Animal Scientist, Feedlot Manager, Livestock Buyer, Meat Processor and Inspector, Veterinarian, Veterinary Technician

Juan M. Tricarico | Vice President, Sustainability Research
Dairy Management Inc. | Rosemont, IL

Describe your job.

My job is to connect science and business for more sustainable stewardship of natural resources used for milk production. It is like being an interpreter whose goal is to help people speaking different languages understand each other. I interpret scientific language for the businesspeople and business language for the scientists. I need to keep up with both the scientific findings and the business needs to do a good job. I work daily with scientists and professionals in academia, industry, government, and non-government organizations.

How did you become interested in pursuing this career?

I studied biology because I liked it a lot in high school. Getting a degree in a basic science allowed me to explore a few options. I was curious about how recommendations by veterinarians and agronomists produce desired results in a farm, so I decided to specialize in the biology of digestion in ruminant animals (four-stomached animals like cows and sheep) and obtained a PhD in animal science. Now I work to answer big questions about U.S. dairy farming and its contributions to the environment, economy, and community.

What school subjects helped prepare you for this job?

Biology definitely helped. I even remember my seventh-grade biology classes when I first learned about the cell and all the intracellular structures and organelles that make life possible. I was fascinated by it and was extremely easy for me to remember. Another school subject that helped me a lot is math. I didn't understand the importance of what I was learning at the time and wish I had paid more attention. Finally, English and particularly learning how to write was extremely valuable.

How are jobs like yours important to the agriculture industry?

Jobs like mine are important to agriculture because they support and improve it constantly. These jobs help farmers figure out what to focus their efforts on and how to improve. My job also helps scientists understand what questions are important to be addressed by their efforts. The benefits go in both directions, and please don't forget that agriculture is very important to us all because it produces all the raw materials used to make the food that nourishes us.

NATURAL RESOURCES



Natural Resources refers to study and management of natural resources such as land, water, soil, plants, and animals. Extensive research and technological advances have played a major role in finding alternatives to non-renewable resources. These advances enable us to preserve and minimize our reliance on those resources that cannot be renewed.

Career Paths: Biological Technician, Conservation Officer, Conservationist, Hydrologist, Restoration Specialist

Ivan Dozier | State Conservationist
USDA-Natural Resources Conservation Service | Champaign, IL

Describe your job.

I oversee the delivery of USDA-NRCS conservation programs and services, including management of staff, throughout the state of Illinois. I work in partnership with other federal, state, and local government agencies as well as agriculture commodity groups and conservation groups to help target our federal resources to meet conservation priorities in Illinois.

How did you become interested in pursuing this career?

I first learned about NRCS (then the Soil Conservation Service) when agency personnel visited our family farm to provide assistance for a livestock watering pond. Later, in college, I learned more about the many types of conservation services provided by NRCS. With my farm background, interest in conservation, and my cultural background it seemed like a perfect fit as a career for me.

What do you enjoy most about your job?

There is something new every day. There is a good mix of indoor and outdoor activity. I get to work alongside some terrific conservationists. I get to travel around the state – and the country – and meet some great farmers who produce all kinds of crops. My job lets me help individual farmers, but also leads to cleaner air and water, and more wildlife habitat for all of us.

What school subjects helped prepare you for this job?

Biology and general science were the most helpful in high school. Chemistry, math, and social studies were also important. In college my classes in soils, crop science, animal science, forestry, and wildlife studies were important foundational areas of study. In graduate school, I learned more about global resources, government policies, and planning.

There are literally thousands of careers in the agriculture industry that require skills and interests from many different areas of study. Read these interviews with agriculture professionals in the fields

of **Plant Science**, **Animal Science**, **Natural Resources**, **Agricultural Business**, **Environmental Services**, **Agriculture Mechanics**, and **Food Science** to learn more about the exciting world of ag careers.

What interests do you have that might pair well with an ag career? What topics are you learning about in school that might help prepare you for one of these careers?

AGRICULTURAL BUSINESS



Daniel Guth | Financial Officer
Compeer Financial | Normal & Pontiac, IL

Describe your job.
I am primarily involved with agriculture lending. I work with farmers and investors on agriculture purpose loans in McLean and Livingston County. I assist with funding for anything from lines of credit, to help putting the crop in the ground, to term loans for equipment and farmland. I also help advise clients on their financial position and also give advice for future financial decisions farmers have to make for their operations.

How did you become interested in pursuing this career?

Like most in this field, I grew up on a farm so I have always had a passion for agriculture. As I was completing my education, I realized I was good with numbers and enjoyed economics and finance classes. Put those two characteristics together and you get a career in Ag Finances. On top of that, my mom worked for the Farm Credit system for 34 years before she retired. Having the knowledge and background on the Farm Credit system made this organization a top target for me once I started pursuing my career in agriculture.

What do you enjoy most about your job?

First, I enjoy working with young, beginning farmers. Being younger myself, it's always nice to be able to help a young farmer buy their first tractor, farm, etc. I also enjoy working in the area I grew up. There are a lot of farmers that I get the pleasure of working with that I have known for years. That made the transition into this career much more enjoyable since I am working with familiar faces. Also, Compeer gives me the flexibility to get out of the office and do business with clients out on their farms.

How are jobs like yours important to the agriculture industry?

Farming is a very high risk/high reward career. I get to work with operations of all different shapes and sizes and the one common thing I have seen is that at some point in their farming careers, everyone needs help with finances. It is a very expensive industry to get into with high revenues and high expenses. It is important for farmers to have options to help them achieve the goals they have for their operation.

Agricultural Business combines the world of agriculture with the fundamentals of business. Business concepts such as economics, management, marketing, finance, human resources, accounting, and others are applied to the agricultural areas of crop production, including contract and non-contract farming, seed supply, agrichemicals, farm machinery, wholesale and distribution, processing, marketing, and retail sales.

Career Paths: Certified Appraiser, Farm Business Accountant, Farm Business Manager, Grain Elevator Manager, Sales Representative, Warehouse Manager

ENVIRONMENTAL SERVICES



Katie Buckley | Water Resources Outreach Specialist
Illinois State Water Survey at the University of Illinois at Urbana-Champaign | Champaign, IL

Describe your job.
I work with project partners to oversee the Private Well Class training program, found online at PrivateWellClass.org, which is a free national educational program that helps to educate private well owners on how to better care for their private wells. I produce webinars on topics related to private well use and manage and oversee the Continuing Education (CE) program for sanitarians, environmental health professionals, and other private well professionals. I also help to design and deliver trainings and presentations to private well owner groups.

Why are you passionate about this career?

I am very passionate about this career because it allows for a unique opportunity to help people. Private wells are not regulated by the federal government, and therefore, private well owners are responsible for maintaining their private wells and making sure that their water is safe to drink. Water is one of our most valuable resources and my position helps people understand that making sure their water is protected from contamination is important from both a health and environmental standpoint.

What do you enjoy most about your job?

One of my most favorite roles is organizing and helping education and outreach activities at various events. I enjoy meeting private well owners and talking about their particular situations and possible solutions to problems. I also love to talk to kids at various events about the groundwater cycle. Our groundwater flow model really helps folks "see" and understand how groundwater is moving and flowing under their feet and is perhaps one of the most unappreciated parts of the water cycle, simply because it is hidden from plain sight.

How are jobs like yours important to the agriculture industry?

The agriculture industry and the water cycle are deeply connected. Water that lands on the fields as rain where crops grow will eventually either become runoff into lakes, rivers, or streams, become part of the groundwater cycle, or return to the atmosphere. Whatever happens on the land's surface can end up in the groundwater that some people may rely on for drinking water, and therefore, it is so important to use best management practices in the agricultural industry. For our private well program, we are focused on educating folks not only about public health protection, but also the importance of source water protection.

Environmental Services is an industry which serves to produce goods, services, or research in efforts to measure, prevent, limit, or correct environmental damages. This includes waste management, noise-related problems, and pollution of water, air, and soil.

Career Paths: Environmental Compliance Officer, Environmental Engineer, Environmental Scientist, Nutrient/Waste Management Specialist

FUN FACTS

Illinois leads the nation in processed food sales.



Illinois has more patents in food-related industries than any other state and more than many countries.



Illinois is #1 in the production of soybeans & #2 in the production of corn.

Kaskaskia Lock & Dam
Modoc, IL



Illinois has over 1,118 miles of navigable waterways, including the Illinois and Mississippi Rivers, which increase the ability to export Illinois grain to the Gulf of Mexico and then to other countries.

CAREERS IN AGRICULTURE



Agriculture Mechanics is the selection, operation, maintenance, service, selling, design, repair, construction, and use of power units, machinery, equipment, structures, and utilities for agricultural purposes. Technological advances have created opportunities to make agricultural jobs quicker, more efficient, accurate, and large scale. Related areas of this profession include structures, land and water management, and electrical applications.

Career Paths: Ag Engineer, Carpenter, Electrical Engineer, Hydraulics Technician, Maintenance/Service Technician, Truck Driver, Welder



Russell Neu | John Deere Tech Instructor/Program Coordinator
Lake Land College | Mattoon, IL

Describe your job.

My job is to train technicians for success at John Deere dealers. Our training consists of theory, operation and diagnostics on all of the major systems found on John Deere equipment. A considerable amount of time is spent on electrical systems, hydraulics, power trains, engines and fuel systems with all emission related components. Students also have specific classes on the operation, adjustments and diagnostics of turf equipment, combines, planters and hay equipment. The goal of our program is to provide dealers with trained technicians and give our students a path to be successful in ag mechanics.

How did you become interested in pursuing this career?

I became interested in being a John Deere Technician my senior year of high school. I had a neighbor that went through the program and worked at our local John Deere dealer. He liked it and it seemed like a good fit for me. I grew up on a farm doing a variety of repairs and building things, most of the time just tinkering! It seemed like a good way to make money with skills I had been using for a long time. I had no idea what else I would need to be successful and I will be forever grateful that the two instructors I had in the program were so knowledgeable.

What do you enjoy most about your job?

Without a doubt the best part of my job is to see the success of our graduated students. Being a former graduate of the program, I can relate to the experiences they have and I know what the expectations are. When I see how they have taken the knowledge and skills they learned and use it to thrive I feel like I am providing a worthwhile service.

What school subjects helped prepare you for this job?

First is what you would expect – any ag or shop classes along with math and science. I think people underestimate the worthiness of a good speech or public speaking class. Even technician jobs require good speaking skills, whether it be explaining a problem on a customer's combine or working with a fellow technician. Back in high school I remember teachers saying how important it was to communicate effectively, but I had no idea how I was underestimating what they had to say.



Food Science is the study of food, food processing, and the improvement of foods for the general public, as well as causes of deterioration. The industry contains various activities ranging from the creation of new foods to designing processes for food creation, packaging materials, and shelf life, among others.

Career Paths: Food Production Supervisor, Food Safety Specialist, Nutrition/Dietician, Product Development Food Scientist, Research and Development Technician



Bryson C. Bolton | Manager of Sensory
Synergy Flavors, Inc. | Wauconda, IL

Describe your job.

I manage a team that provides sensory insights to our R&D, Quality, Sales, Marketing, and Business Development teams at Synergy Flavors, Inc. Sensory Science is "a scientific discipline used to evoke, measure, analyze, and interpret reactions to those characteristics of food and other materials as they are perceived by the senses of sight, smell, touch, taste, and hearing" (Stone and Sidel, 2004).

How did you become interested in pursuing this career?

I first became interested in Food Science while in high school. I attended Chicago High School for Agricultural Sciences in Chicago, IL. During this time, I was more interested in Ag Finance, but it wasn't until I participated in an Apprenticeship program at Alabama A&M University, that I found my passion for Food and Sensory Science. During the apprenticeship, I had an opportunity to develop a food product and have people taste, evaluate, and provide feedback about my product. This program solidified my interest in food science and human perception.

What do you enjoy most about your job?

I like designing sensory studies that help answer research questions about a product or category. I also enjoy investigating the reasons behind consumer product purchase and usage.

How are jobs like yours important to the agriculture industry?

Sensory Scientists help food and ingredient companies decide on which products should go to market, by employing various types of sensory tests to answer different types of research questions, such as: Is this new cookie different from our cookie that is on the market? How is this new cookie different from our cookie that is on the market? Do our consumers like this new cookie better than the cookie that is on the market?



Illinois is 3rd in the nation for agricultural exports.

Exports account for 6% of all U.S. agricultural exports.



Illinois is 3rd in the nation for the number of farmers markets.



Each year, more than 274 million bushels of Illinois-grown corn are used to produce more ethanol than any other state.

Information in this Ag Mag may be linked to the following Standards:

Common Core Literacy Standards: CCSS.ELA.Literacy.RI.4.1; RI.4.2; RI.4.3; RI.4.4; RI.4.5; RI.4.7; CCSS.ELA.Literacy.RST.6-8.2; RST.6-8.4; RST.6-8.7

Next Generation Science Standards: Earth and Human Activity: 4-ESS3-1; 5-ESS3-1

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