Employment Opportunities

for College Graduates in the U.S. Food, Agricultural, and Natural Resources System

2005-2010

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Contents

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More Information

This summary report is from a 2004 national study conducted under Cooperative Agreement 2004-38837-01875 between the Cooperative State Research, Education, and Extension Service of the U.S. Department of Agriculture and the Purdue University College of Agriculture.

You can find more information about this study and results at:

http://faeis.usda.gov/supplydemand/2005-2010/

Additional data regarding higher education programs in food, agricultural, and natural resources disciplines may be obtained at the following site:

http://faeis.usda.gov

Produced through a cooperative agreement between USDA's Cooperative State Research, Education, and Extension Service and Purdue University.

The Big Picture

Employment opportunities for U.S. college graduates with expertise in the food, agricultural, and natural resources system are expected to remain strong during the next five years. We expect slightly more than 52,000 annual job openings for new graduates during 2005-2010, and some 49,300 qualified graduates available each year for these positions.

Annually, an average of approximately 32,300 new graduates from U.S. colleges of agriculture and life sciences, forestry, and veterinary medicine are expected to take jobs in the system. Other job openings will be filled by some 17,000 qualified graduates from allied higher education programs such as biological sciences, engineering, business, health sciences, communication, and applied technologies.

Four major factors will define the market for graduates during 2005-2010:

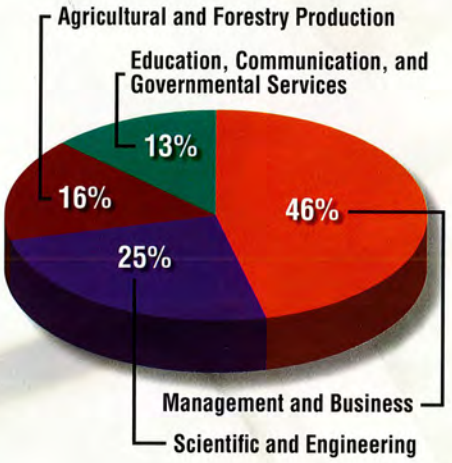
- Consumers and their preferences.
- Evolving business structure in the U.S. food system.
- New developments in science and technology.
- Public policy choices and food system security.

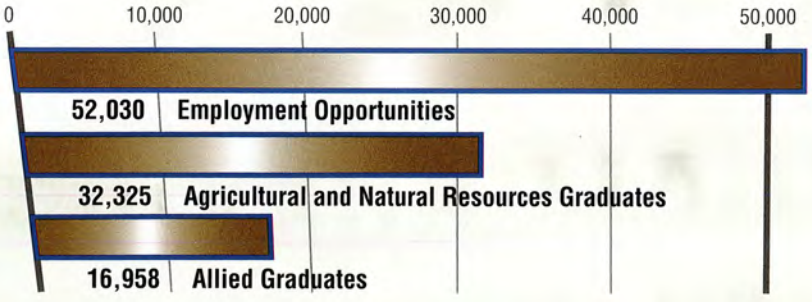
You'll find most opportunities in management and business, where graduates can expect more openings than qualified applicants. Graduates also can expect a large number of positions in scientific and engineering specialties. They'll find specialized niche opportunities in agricultural and forestry production. Ample qualified graduates are forecast for positions in education, communication, and governmental services.

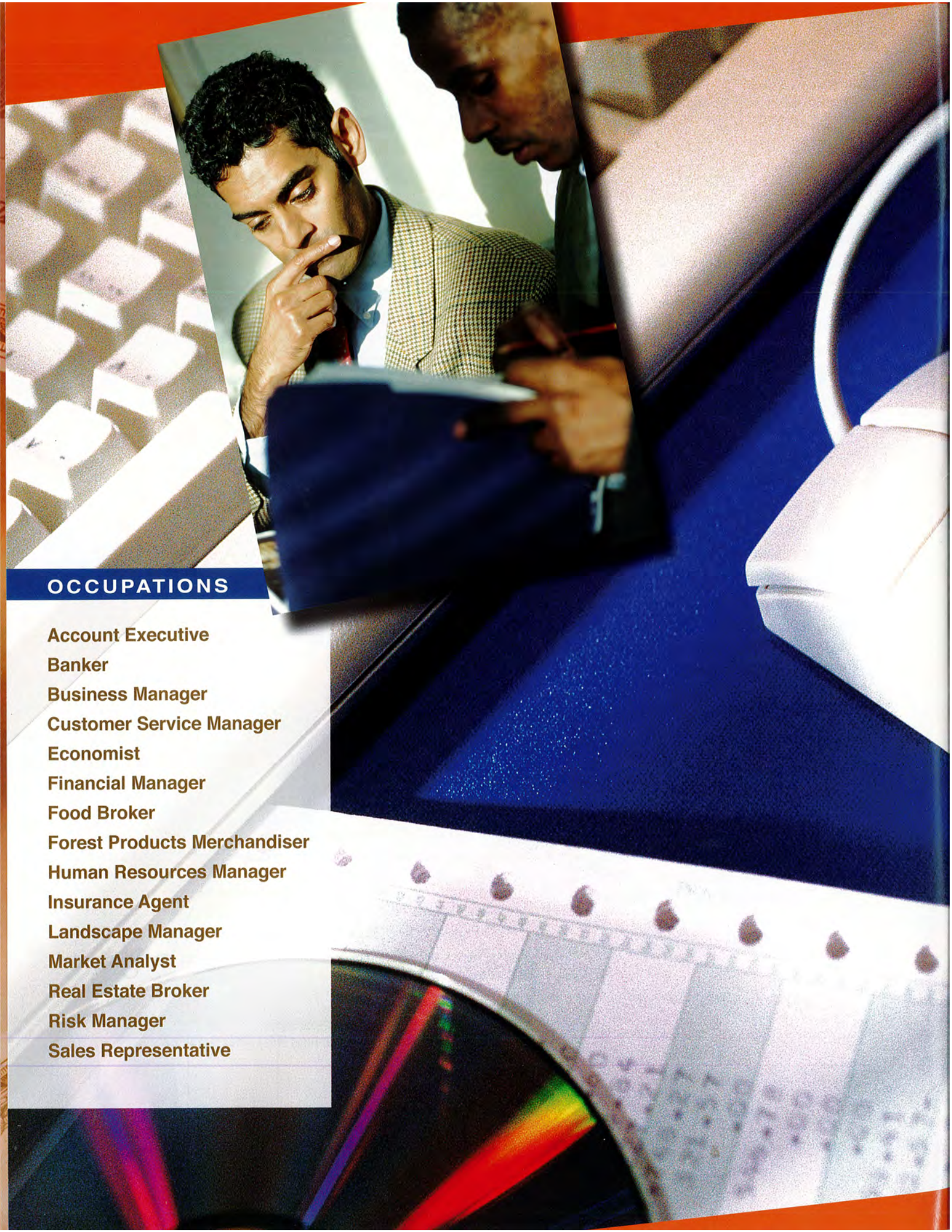
New graduates can expect the best opportunities in:

- sales and marketing,
- veterinary medical specialties,
- food safety and biosecurity,
- forest ecosystem management,
- precision agriculture technologies,
- biomaterials engineering,
- landscape and horticultural crops,
- plant and animal genetics,
- specialty crops production,
- food and nutrition services,
- environmental science and management,
- food system nanotechnologies,
- plant and animal inspection,
- consumer information technologies, and
- animal health care and well-being.

Employment Opportunities







OCCUPATIONS

- Account Executive
- Banker
- Business Manager
- Customer Service Manager
- Economist
- Financial Manager
- Food Broker
- Forest Products Merchandiser
- Human Resources Manager
- Insurance Agent
- Landscape Manager
- Market Analyst
- Real Estate Broker
- Risk Manager
- Sales Representative

Management and Business Occupations

You can expect approximately 24,000 annual openings compared to about 20,200 graduates with expertise in these areas. In fact, of all projected jobs for college graduates in the food, agricultural, and natural resources system, you'll find just under half (46 percent) in management and business occupations.

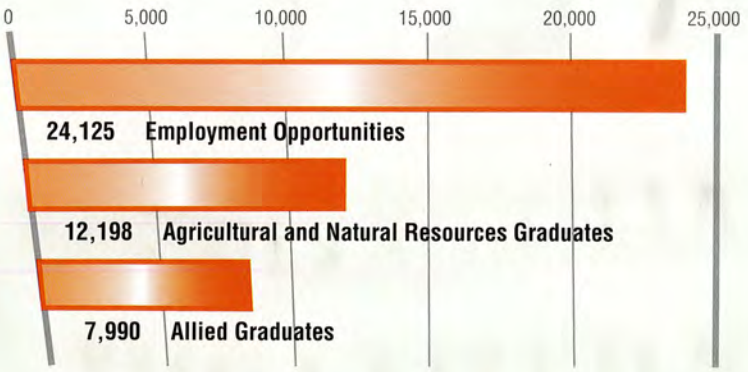
Expect strong employment opportunities for:

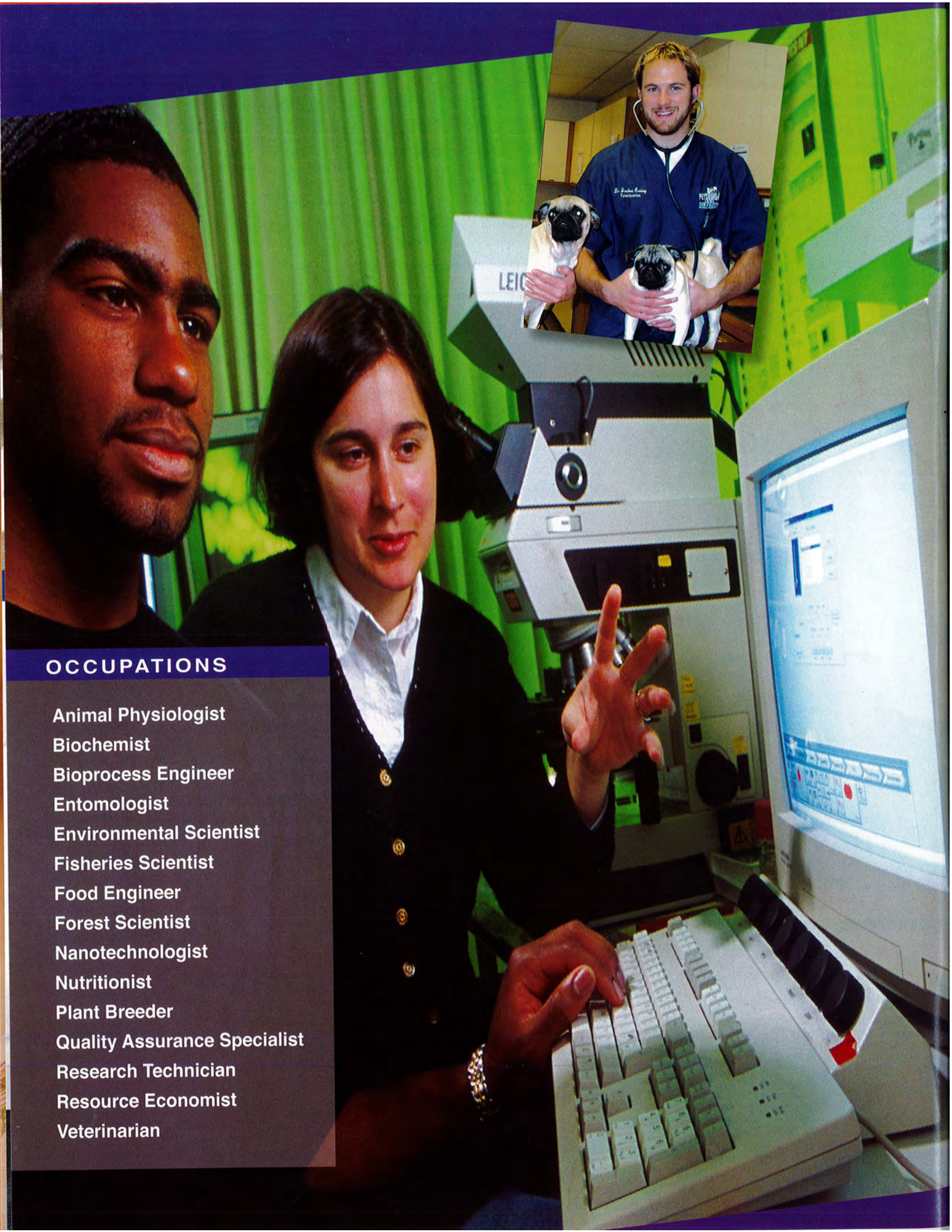
- technical sales representatives,
- food brokers,
- accountants and financial managers,
- forest products salespersons,
- market analysts,
- fruit and vegetable marketing representatives,
- sales managers,
- landscape managers,
- small animal health care product distributors, and
- international business specialists.

If you take a job in one of these areas, you will work in a sales, supervisory, or managerial position for an organization that adds value to agricultural and forest commodities.

You'll find opportunities for graduates in service professions including golf course superintendents, business consultants, insurance representatives, and human resources consultants. However, expect declining employment opportunities for sales and business representatives who provide production inputs to farmers and ranchers. As businesses continue to merge, you'll find fewer merchandisers of grains and food animals.

Colleges offering degrees in agriculture and natural resources are expected to produce 60 percent of the graduates who will compete for these positions. We project that 40 percent of the qualified graduates will have degrees in allied fields such as marketing, business management, economics, advertising, accounting, and retailing.





OCCUPATIONS

- Animal Physiologist
- Biochemist
- Bioprocess Engineer
- Entomologist
- Environmental Scientist
- Fisheries Scientist
- Food Engineer
- Forest Scientist
- Nanotechnologist
- Nutritionist
- Plant Breeder
- Quality Assurance Specialist
- Research Technician
- Resource Economist
- Veterinarian

Scientific and Engineering Occupations

You can expect about 13,000 annual openings for new graduates, while about 12,700 qualified individuals will enter the job market each year — leaving a slight shortfall. Scientists, engineers, veterinarians, and technical specialists likely will account for about 25 percent of all projected jobs for college graduates in the food, agricultural, and natural resources system.

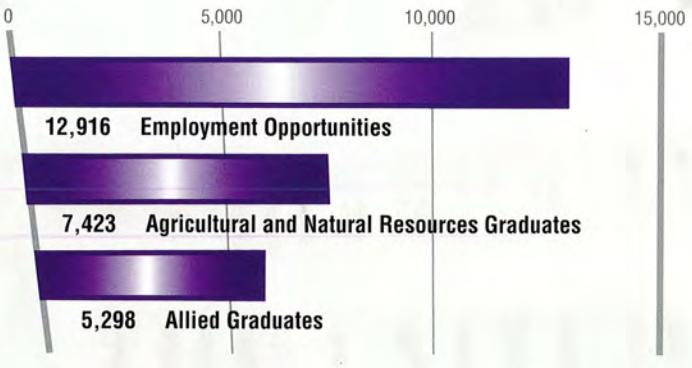
You'll find most opportunities for graduates with skills in:

- precision agriculture,
- functional genomics and bioinformatics,
- forest science,
- plant and animal breeding,
- biomaterials engineering,
- food quality assurance,
- nanotechnology,
- animal health and wellbeing,
- nutraceuticals development, and
- environmental science.

Scientists and technical specialists will find employment opportunities in both business and government research laboratories. In contrast, most engineers will work in industries. Veterinarians will likely specialize and join the growing number of group veterinary practices and animal hospitals. Changing U.S. population demographics will continue to open up opportunities for nutritionists and dietitians.

Expect relatively fewer opportunities for agricultural machinery engineers, wildlife scientists, and veterinarians in general practices. Also, you'll likely find limited openings for soil scientists, agricultural meteorologists, and range scientists.

Colleges offering programs in veterinary medicine and in agriculture and natural resources will graduate between 55-60 percent of the qualified applicants for these positions. Other prepared graduates will come from allied fields such as biological sciences, chemistry, mechanical engineering, chemical engineering, and health sciences.



OCCUPATIONS

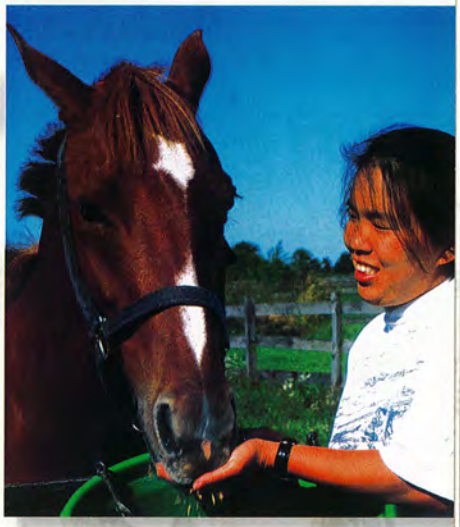
- Animal Breeder
- Aquaculturist
- Equine Operator
- Farm Manager
- Farmer
- Feedlot Manager
- Forest Manager
- Fruit and Vegetable Grower
- Greenhouse Manager
- Nursery Operator
- Rancher
- Seed Producer
- Tree Farmer
- Turf Producer
- Viticulturist

Agricultural and Forestry Production Occupations

You can expect approximately 8,000 annual employment opportunities compared to 7,100 graduates with the required preparation. Overall, 16 percent of all new positions for college graduates with expertise in the food, agricultural, and natural resources system will be found in agricultural and forestry production.

You can expect good job opportunities as:

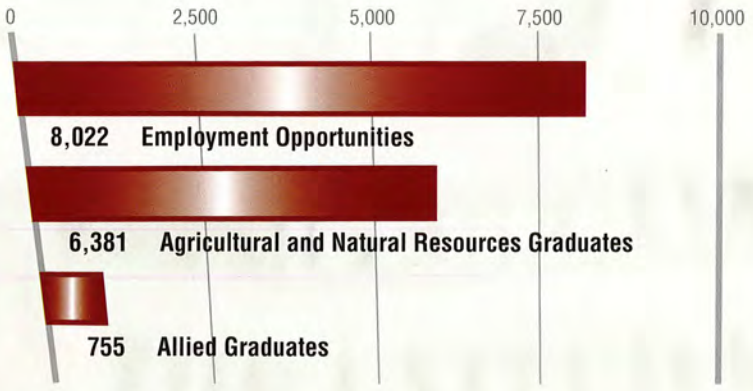
- producers of fruits and vegetables,
- growers of specialty crops that provide raw materials for medical and energy products,
- managers of specialized livestock operations,
- forest managers,
- growers of landscape plants and trees,
- managers of aquaculture operations,
- turf producers,
- equine operators,
- organic farmers, and
- providers of outdoor recreation.

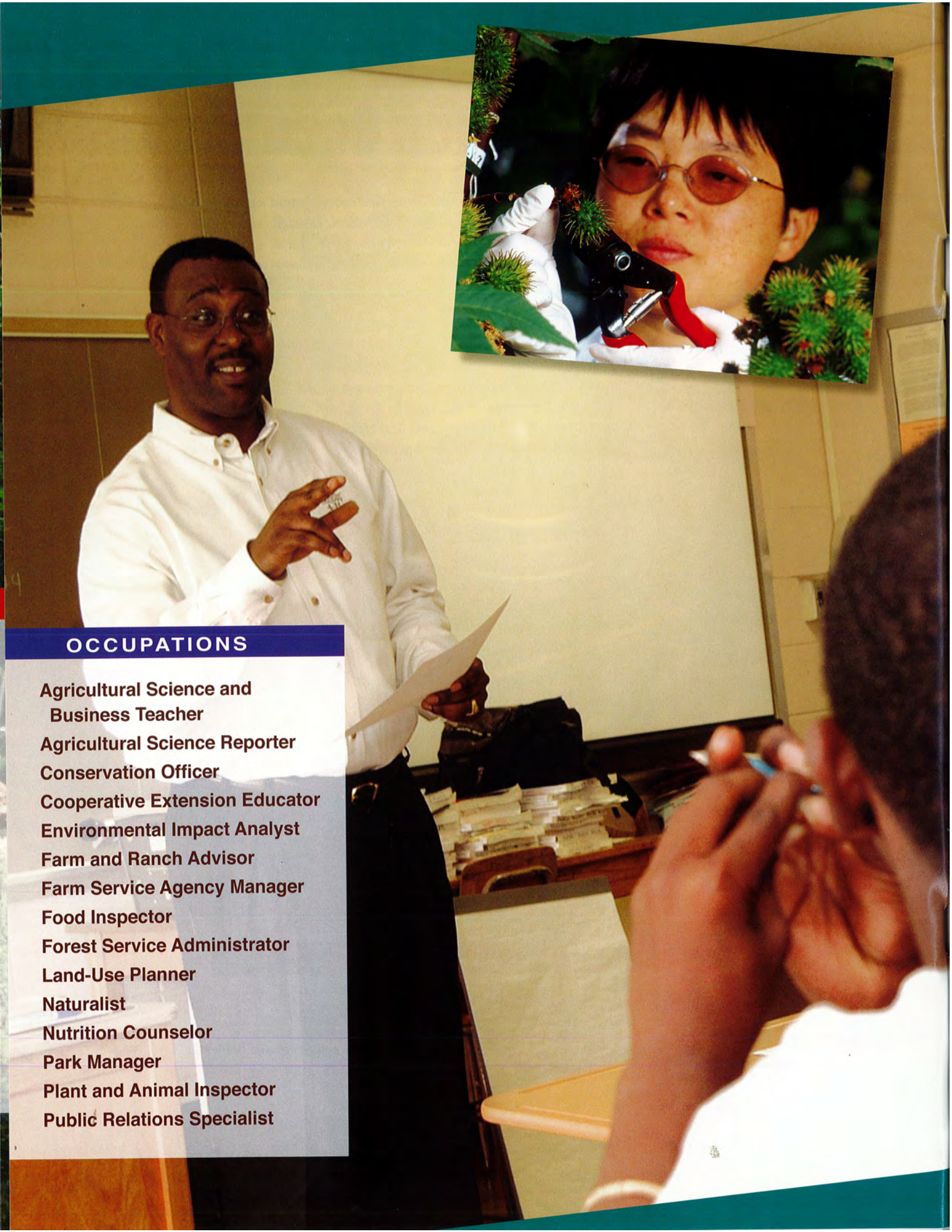


As in the past, most positions in this area are for farmers, ranchers, and herd managers. However, as agricultural production units continue to consolidate, you'll find fewer opportunities for producers of traditional commodities (e.g., wheat, corn, cotton, soybeans, cattle, and hogs).

Expect more opportunities for growers of specialty crops, fruits and vegetables, and landscape horticultural crops. Producers who can capture niches and who market products and services (including recreation) directly to consumers likely will find more opportunities.

Colleges of agriculture and natural resources will graduate about 90 percent of the qualified applicants for positions in agricultural and forestry production. Others will have degrees in allied fields including business, biological sciences, and applied technologies.





OCCUPATIONS

- Agricultural Science and Business Teacher
- Agricultural Science Reporter
- Conservation Officer
- Cooperative Extension Educator
- Environmental Impact Analyst
- Farm and Ranch Advisor
- Farm Service Agency Manager
- Food Inspector
- Forest Service Administrator
- Land-Use Planner
- Naturalist
- Nutrition Counselor
- Park Manager
- Plant and Animal Inspector
- Public Relations Specialist

Education, Communication, and Governmental Services Occupations

You'll find about 7,000 annual job openings in this occupational cluster, some 13 percent of all available positions in the nation's food, agricultural, and natural resources system. However, you can expect about 9,300 qualified graduates in this area each year.

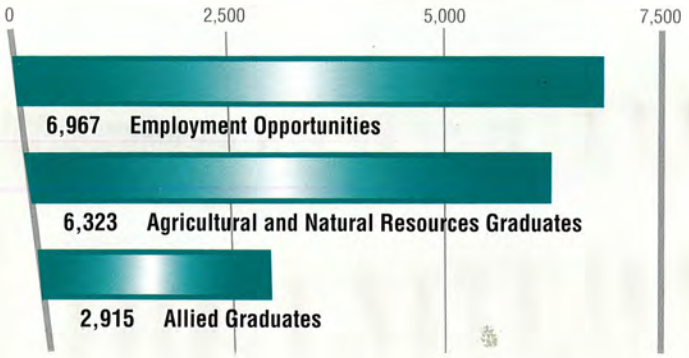
Expect to find opportunities in:

- plant and animal inspection,
- public health administration,
- biotechnology impact assessment,
- foods and nutrition services,
- outdoor recreation,
- food system security,
- consumer information technologies,
- environmental management,
- high school agricultural science and business teaching, and
- land-use planning occupations.

You'll find the largest number of opportunities in public service positions associated with maintaining our nation's food system security and environmental sustainability. Also, expect expanding opportunities in nutritional and health occupations geared to serve an aging population. You'll likely find opportunities for those qualified to teach high school agricultural science and business courses, to expand outdoor recreation opportunities (both public and private), and to facilitate land-use choices.

You can expect limited opportunities as agricultural communicators, farm and ranch advisors, and government farm service agents.

We expect colleges of agriculture and natural resources to graduate about 70 percent of the qualified applicants who will seek education, communication, and governmental services positions in the food, agricultural, and natural resources system. Other applicants will come from allied degree fields including foods and nutrition, communication, social services, public administration, biological sciences, and information technologies.



Major Factors Affecting the Market for Graduates

Many factors will affect the market for college graduates in the U.S. food, agricultural, and natural resources system during 2005-2010. We believe the most important ones are:

- **Consumers and their preferences** dictate that products and services derived from agricultural and forest raw materials must help maintain contemporary lifestyles. Population growth, changing ethnic and age demographics, and evolving food and health literacy strongly influence both what is produced and the expertise required to meet consumer demands.

- **The evolving business structures** that support the U.S. food system continue to be influenced by globalization and consolidation. Expertise needs will evolve and will create a need for graduates with excellent business skills, international understanding, and leadership qualities. Graduates must deal with increasing market uncertainty, risk analysis, petroleum dependence, niche business opportunities, and global food production and distribution systems.

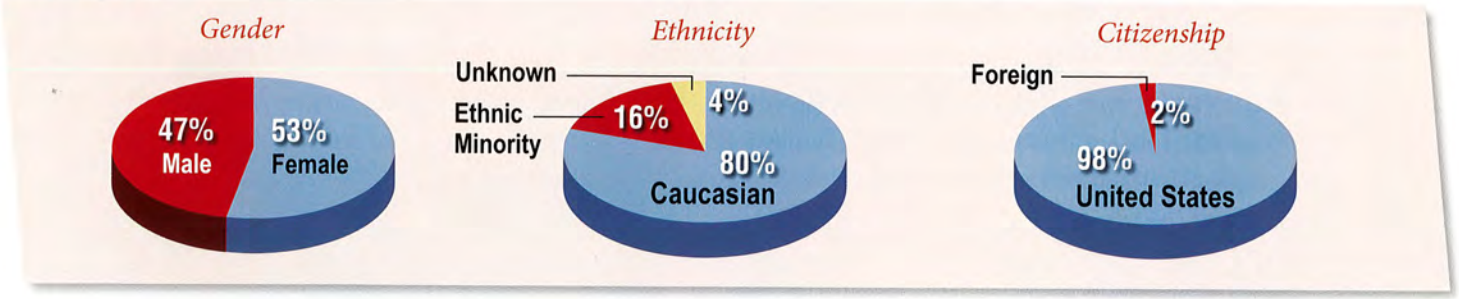
- **New developments in science and technology** are being driven by changes in biosecurity, the expanding global population, health concerns, shrinking natural resources, and climate change. Emerging biotechnologies and nanotechnologies are powerful tools to increase food system efficiency. Other scientific developments help us maintain renewable natural resources. All of these require graduates with basic science skills and the ability to solve problems with scientific applications.

- **Public policy choices and food system security** affect the market for graduates who provide public services in education, natural resource management, food assistance, and recreation. Public concerns regarding diet and health, food safety, and the environment dictate the number and kinds of graduates needed to manage regulatory programs and provide services to assist producers and others working in the food and natural resources system.

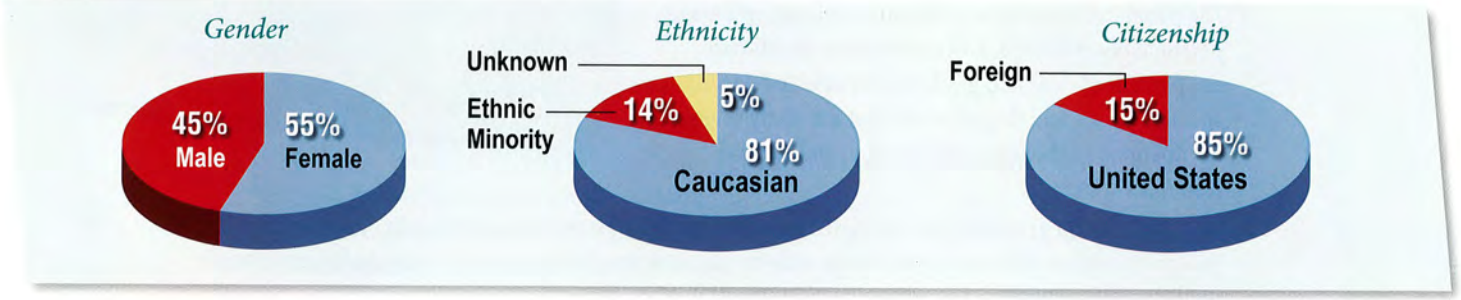
Characteristics of Graduates

Most recent available data, 2001-02, indicate that graduates of U.S. Colleges of Agriculture and Life Sciences, Forestry, and Veterinary Medicine had the following characteristics. Gender and ethnicity graphs include only U.S. citizens.

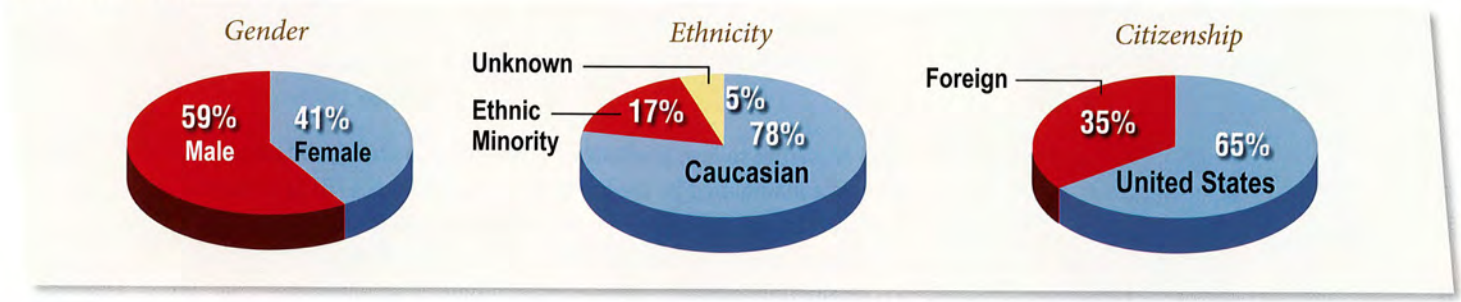
Bachelor's



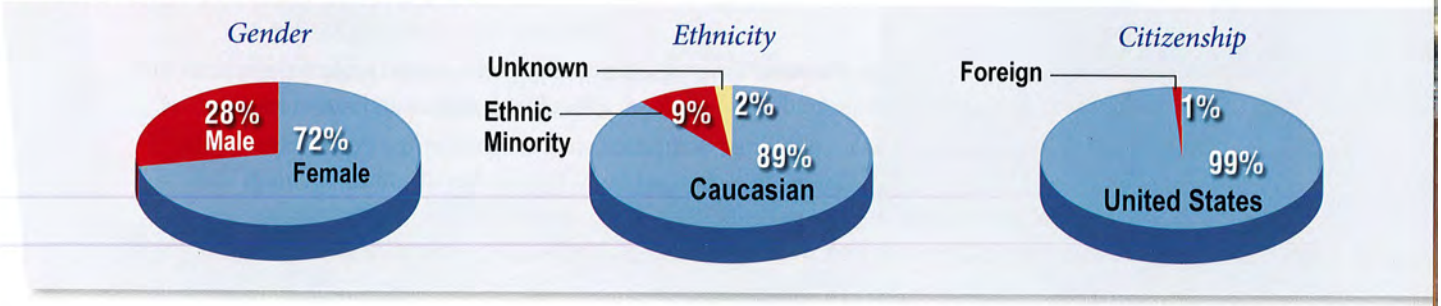
Master's



Doctors of Philosophy



Doctors of Veterinary Medicine



Source: National Center for Education Statistics

Study Methodology

Available Graduates

The number of college graduates — baccalaureate degree and higher — deemed qualified for positions in the U.S. food, agricultural, and natural resources system was determined by using 2001-02 degrees conferred data from the Integrated Postsecondary Education Data System (IPEDS) surveys conducted by the National Center for Education Statistics (NCES) of the U.S. Department of Education. The NCES database includes postsecondary degrees conferred by all accredited public and private universities in the United States. Graduates are classified by degree level, degree specialization, and selected demographic characteristics.

- A panel of experts worked with the authors to select the NCES degree specializations from which graduates are qualified for occupations requiring food, agricultural, and natural resources expertise.
- Degree specializations were chosen not only from those usually offered by colleges of agriculture and life sciences, forestry, and veterinary medicine, but also allied fields offered by colleges of science, engineering, communication, business, health sciences, and others.
- The panel used historical graduate employment data, personal observations, and experiences to estimate the percent of qualified graduates by selected degree specializations and degree levels that are likely to enter occupations in the food, agricultural, and natural resources system.
- Non-U.S. citizen graduates, an estimated percentage of graduates who continue in educational programs, and an estimated percentage who do not seek employment were subtracted to determine the final pool of qualified graduates to enter the U.S. labor force.
- Qualified graduates in each degree specialization and degree level were assigned by the expert panel to one or more of the four occupational clusters. In most cases, total qualified graduates were apportioned among two or more occupational clusters.
- Graduate numbers were then aggregated in each of the four occupational clusters.

Employment Opportunities

Projected employment opportunities requiring college graduates with food, agricultural, and natural resources expertise were based upon data maintained by the Bureau of Labor Statistics (BLS) of the U.S. Department of Labor (DOL). Occupational employment data for 2002 with projections to 2012 were published in the DOL *Monthly Labor Review* in February of 2004. Projected annual employment opportunities are reported for each occupation included in the BLS taxonomy.

- From the total list of BLS occupations, the panel of experts worked with the authors to select those that would be expected to require college graduates with food, agricultural, and natural resources expertise.
- For each selected occupation, the panel assigned a percentage to the annual projected openings that were deemed to require college graduates with food, agricultural, and natural resources expertise.
- Adjusted annual openings in each selected occupation were assigned by the expert panel to one or more of the four occupational clusters. In most cases, the number of annual openings were apportioned among two or more occupational clusters.
- Employment opportunities were then summed in each of the four occupational clusters.

For more details about the study methodology and data used in producing this report, log on to http://faeis.usda.gov/supplydemand/2005-2010/. Click on "Technical Addendum."

Acknowledgements

This is the sixth of a series of five-year employment opportunities projections initiated by the U.S. Department of Agriculture (USDA). The basic methodology used in this series of studies was developed by Drs. K. Jane Coulter and Marge F. Stanton, former USDA employees. Some modifications in methodology were introduced in producing the 2005-2010 report to utilize the national degrees conferred and occupations data more effectively in conducting the study.

We extend special thanks to Frank Morgan of the National Center for Education Statistics, U.S. Department of Education, and Lynn Shniper of the Bureau of Labor Statistics, U.S. Department of Labor, for their assistance in accessing and utilizing data maintained by these agencies.

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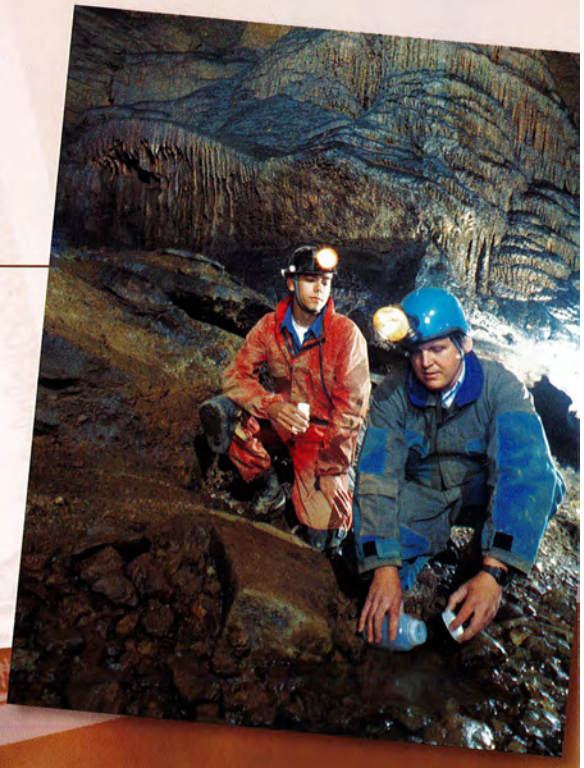

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