



USDA Employment Opportunities Reports

AGENDA

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3. Available Graduates Projections – 2015-2020
4. The Big Picture and Market Factors – 2015-2020
5. Management and Business Occupations
6. Science and Engineering Occupations
7. Agricultural and Forestry Production Occupations
8. Education, Communication, and Governmental Services Occupations



USDA Employment Opportunities Reports

Brief History

The Food and Agriculture Act of 1977 (PL 95-113) designated the U.S. Department of Agriculture as the lead Federal agency for research, extension, and **teaching** in the food and agricultural sciences.

Oversight of higher education programs in agriculture was transferred from the U.S. Office of Education.



USDA Employment Opportunities Reports

The Food and Agriculture Act of 1977 (PL 95-113)

The Secretary of Agriculture shall keep informed of the nation's need for research, extension, teaching, and manpower development in the food and agricultural sciences.

1978

Office of Higher Education was established in The Science and Education Administration (SEA) of the U.S. Department of Agriculture.

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1980

Graduates of Higher Education in the Food and Agricultural Sciences: An Analysis of Supply/Demand Relationships.

**Kyle Jane Coulter
Marge Stanton**



**1980 - 1985 Education Consultants: Stephen R. Chapman,
J. Robert Cooke, Ed Glazener, Allan Goecker, Richard Merritt,
Winston E. Pullen**

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1985 - 1990

**Employment Opportunities for
College Graduates in the Food
and Agricultural Sciences –
Agriculture, Natural Resources
and Veterinary Medicine**

Kyle Jane Coulter

Marge Stanton

Allan D. Goecker



**1985 - 1990 Education Consultants: P. Vernon Armbruster,
Michael J. Burke, John Buckhouse, Stephen R. Chapman,
Ed Glazener, Warren K. Wessels**

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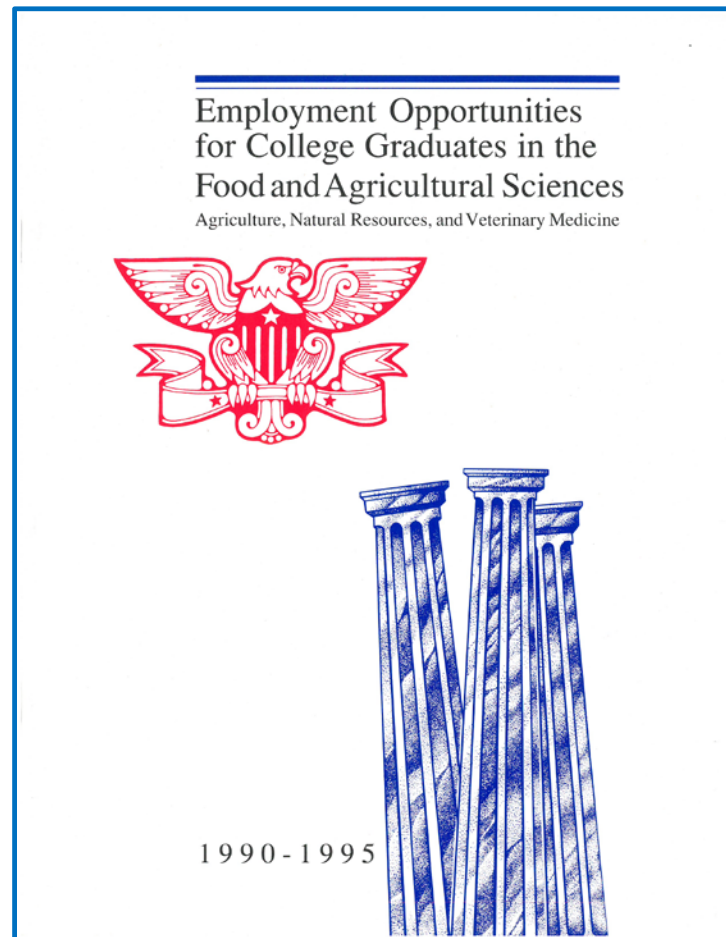
1990 - 1995

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College Graduates in the Food
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Kyle Jane Coulter

Marge Stanton

Allan D. Goecker



**1990 - 1995 Education Consultants: James B. Marcum,
Gary Schneider, James Shuford, Weldon S. Sleight, Warren K. Wessels**

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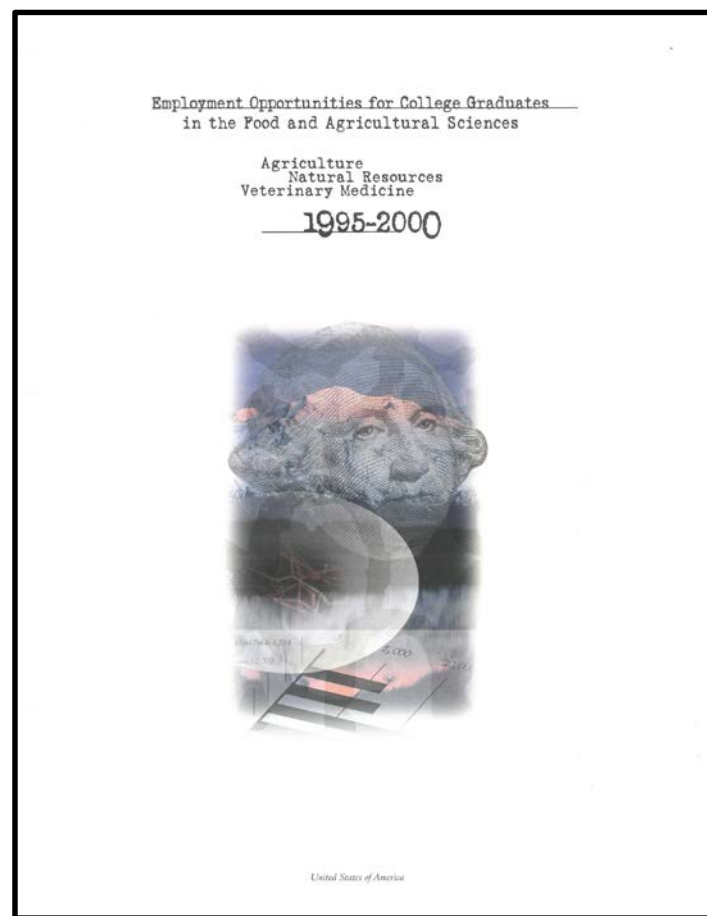
1995 - 2000

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and Veterinary Medicine**

Kyle Jane Coulter

Marge Stanton

Allan D. Goecker



**1995 - 2000 Education Consultants: Roger Bruene, Daniel D. Godfrey,
Kim Harris, Raymond A. Miller, Gary Schneider, W. David Shoup,
H. Dean Sutphin**

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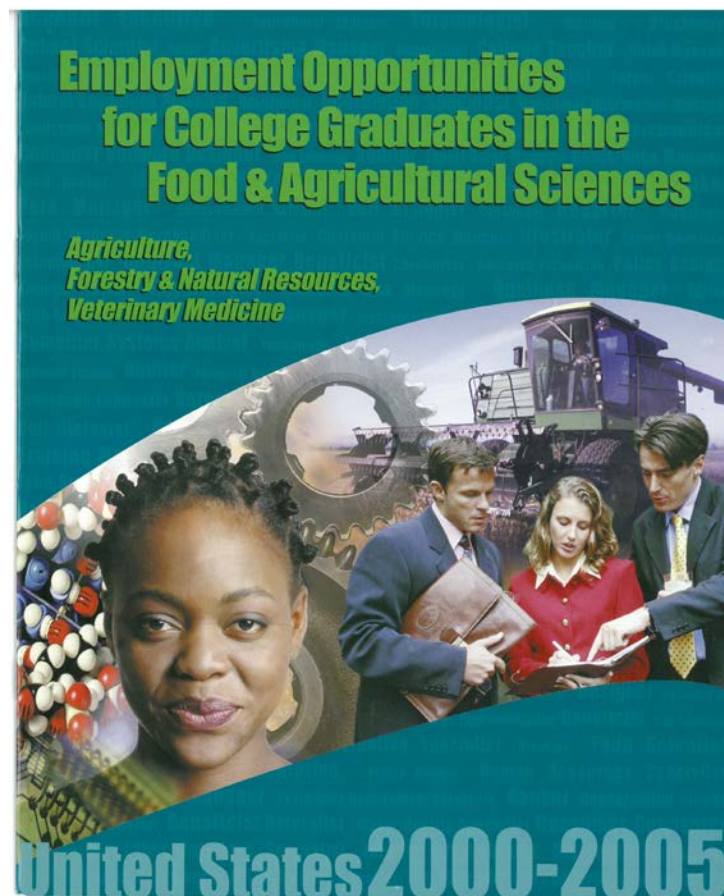
2000 - 2005

**Employment Opportunities for
College Graduates in the Food
and Agricultural Sciences –
Agriculture, Natural Resources,
and Veterinary Medicine**

Allan D. Goecker

Jeffrey L. Gilmore

Christopher M. Whatley



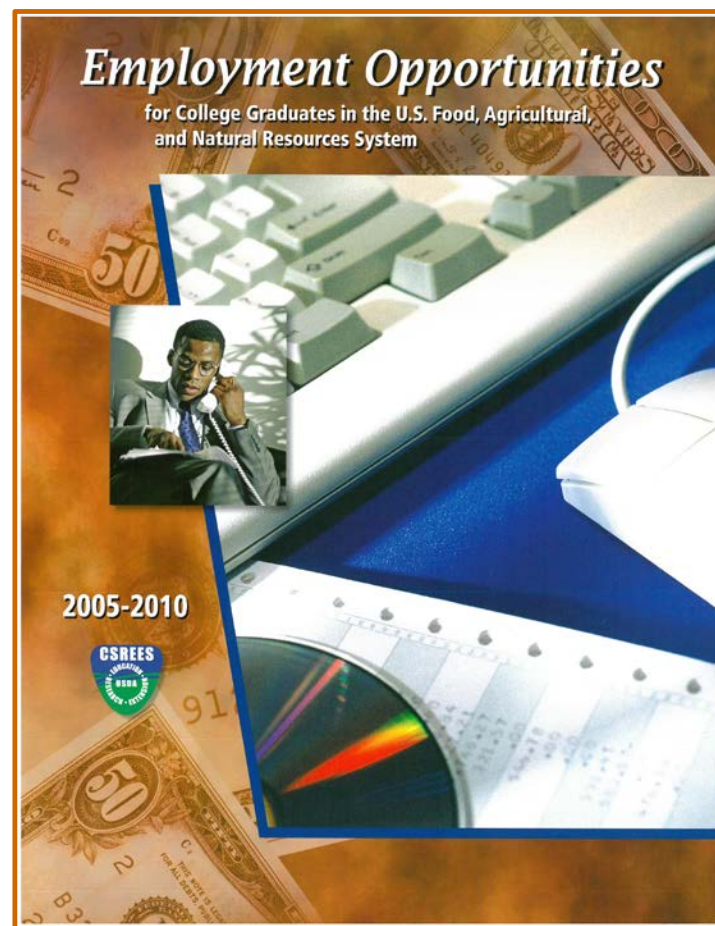
2000 - 2005 Education Consultants: R. Kirby Barrick, Kyle Jane Coulter, Daniel D. Godfrey, James C. Heird, Thomas J. Lindahl, Marge Stanton, P. Gregory Smith, H. Dean Sutphin

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2005 - 2010

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

**Allan D. Goecker
Jeffrey L. Gilmore
Ella Smith
P. Gregory Smith**



**2005 - 2010 Education Consultants: Charles Crabb, David B. Field,
McArthur Floyd, James W. Lloyd, Ian L. Maw, Virginia Moxley,
Charles E. Olson, Janice C. Swanson**

USDA Employment Opportunities Reports

2010 - 2015


Employment Opportunities for College Graduates in Food, Renewable Energy, and the Environment – United States

Allan D. Goecker

Ella Smith

P. Gregory Smith

Rebecca Goetz



Employment Opportunities for College Graduates in Food, Renewable Energy, and the Environment
United States, 2010-2015

Executive Summary

- Management & Business
- Science & Engineering
- Agricultural & Forestry Production
- Education, Communication, and Governmental Services

The agricultural, food, and renewable natural resources sectors of the U.S. economy will generate an estimated 54,400 annual openings for individuals with baccalaureate or higher degrees in food, renewable energy, and environmental specialties between 2010 and 2015. Seventy-four percent of the jobs are expected in business and science occupations; 15 percent in agriculture and forestry production; and 11 percent in education, communication, and governmental services.

During 2010-15, five percent more college graduates with expertise in agricultural and food systems, renewable energy, and the environment will be needed when compared to 2005-10. More than enough graduates will likely be available during the next couple of years in some occupations, but a shortfall of new graduates with preparation in priority business and science specialties is forecast in the latter half of the period.

Four major factors shape the market for graduates between 2010 and 2015:

- Macroeconomic conditions and retirements
- Consumer preferences for nutritious and safe foods
- Food, energy, and environment public policy choices
- Global market shifts in population, income, food, and energy

GRADUATES

Expect approximately 53,500 qualified graduates to be available each year. About 55 percent of the total, 29,300 are expected to earn degrees from colleges of agriculture and life sciences, forestry and natural resources, and veterinary medicine. The other 45 percent, an estimated 24,200 graduates, will come from allied disciplines including biological sciences, engineering, health sciences, business, and communication.

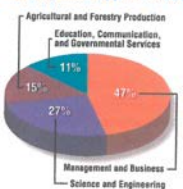
Employers have expressed a preference for graduates from colleges of agriculture and life sciences, forestry and natural resources, and veterinary medicine who tend to have relatively stronger interests and more extensive work experiences for careers in food, renewable energy, and the environment than those from allied fields of study. These graduates will likely continue to be preferred by many employers, but it is important to note that there were nearly 10 percent fewer agriculture and life sciences, forestry and natural resources, and veterinary medicine graduates produced in U.S. colleges and universities in 2008 than in 2002.

The Food and Agricultural Education Information System maintains enrollment data by academic specialty that are reported by colleges of agriculture and life sciences, forestry and natural resources, and veterinary medicine. Enrollments during 2004-09 suggest some increases in agribusiness management, agricultural mechanization and engineering, animal science, food science, and natural resources management graduates during 2010-15. In contrast, fewer graduates in the plant sciences, soil sciences, and horticultural specialties are anticipated during the next five years, and there will likely be little change in the annual production of forestry and wildlife science graduates.

Relatively more graduates from the allied fields of biological and health sciences will be required to fill positions that address consumer preferences for a safe and nutritious food supply. Likewise, more earth and atmospheric scientists and environmental engineers will be required to deal with the evolving public policy choices in energy and the environment.

Shortfalls of qualified graduates to work as plant geneticists and plant breeders, climate change analysts, and food safety and security specialists are anticipated during 2010-15.

Employment Opportunities



Category	Percentage
Management and Business	47%
Education, Communication, and Governmental Services	15%
Science and Engineering	11%

2010 - 2015 Education Consultants: Carol L. Anderson, Perry Brown, Gregorio Billikopf Encina, J. Marcos Fernandez, Mike Gaul, Patrick D. O'Rourke, Govind C. Sharma, Bettye K. Walters

USDA Employment Opportunities Reports

2015 - 2020

Employment Opportunities for College Graduates in Food, Agriculture, Renewable Natural Resources, and Environment – United States

Allan D. Goecker

Ella Smith

J. Marcos Fernandez

Rebecca Goetz

Ray Ali

USDA United States Department of Agriculture

Management/Business Science/Engineering Food/Biomaterials Production Education/Communication/Government

Employment Opportunities 2015-2020

- > Management & Business
- > Science & Engineering
- > Food & Biomaterials Production
- > Education, Communication & Governmental Services
- > Market Factors
- > Sources and Methodology
- > Characteristics of Graduates
- > Acknowledgements
- > Report Summary (PDF)

Employment Opportunities for College Graduates in Food, Agriculture, Renewable Natural Resources, and the Environment
United States, 2015-2020

Opportunities

During the next five years, U.S. college graduates will find good employment opportunities if they have expertise in food, agriculture, renewable natural resources, or the environment. Between 2015 and 2020, we expect to see 57,900 average annual openings for graduates with bachelor's or higher degrees in those areas.

According to our projections, almost half of the opportunities will be in management and business. Another 27% will be in science, technology, engineering, and mathematics (STEM). Jobs in sustainable food and biomaterials production will make up 15%, while 12% of the openings will be in education, communication, and governmental services.

Category	Percentage
Food and Biomaterials Production, Education, Communication, and Governmental Services	46%
Management and Business	27%
Science and Engineering	12%

The projections in this report are based on data from several sources. The Bureau of Labor Statistics forecasts a 10.8% increase in the U.S. labor force between 2012 and 2022 due to job growth and openings from retirement or other replacements. We expect employment opportunities in food, agriculture, renewable natural resources, and environment occupations to grow more than 5% between 2015 and 2020 for college graduates with bachelor's or higher degrees.

Job opportunities for food, agriculture, renewable natural resources, and environment graduates in STEM areas are expected to grow. Expect the strongest job market for plant scientists, food scientists, sustainable biomaterials specialists, water resources scientists and engineers, precision agriculture specialists, and farm-animal veterinarians.

We expect to see a strong employment market for e-commerce managers and marketing agents, ecosystem managers, agriscience educators, crop advisors, and pest control specialists.

2015 - 2020 Education Consultants: Antoine J. Alston, R. Kirby Barrick, Richard A. Cavaletto, Cameron Faustman, John C. Foltz, Mike Gaul, Terry L. Sharik, Susan Sumner



**2015-2020 Employment Opportunities For College
Graduates in Food, Agriculture, Renewable
Natural Resources, and Environment**

Education Consultants

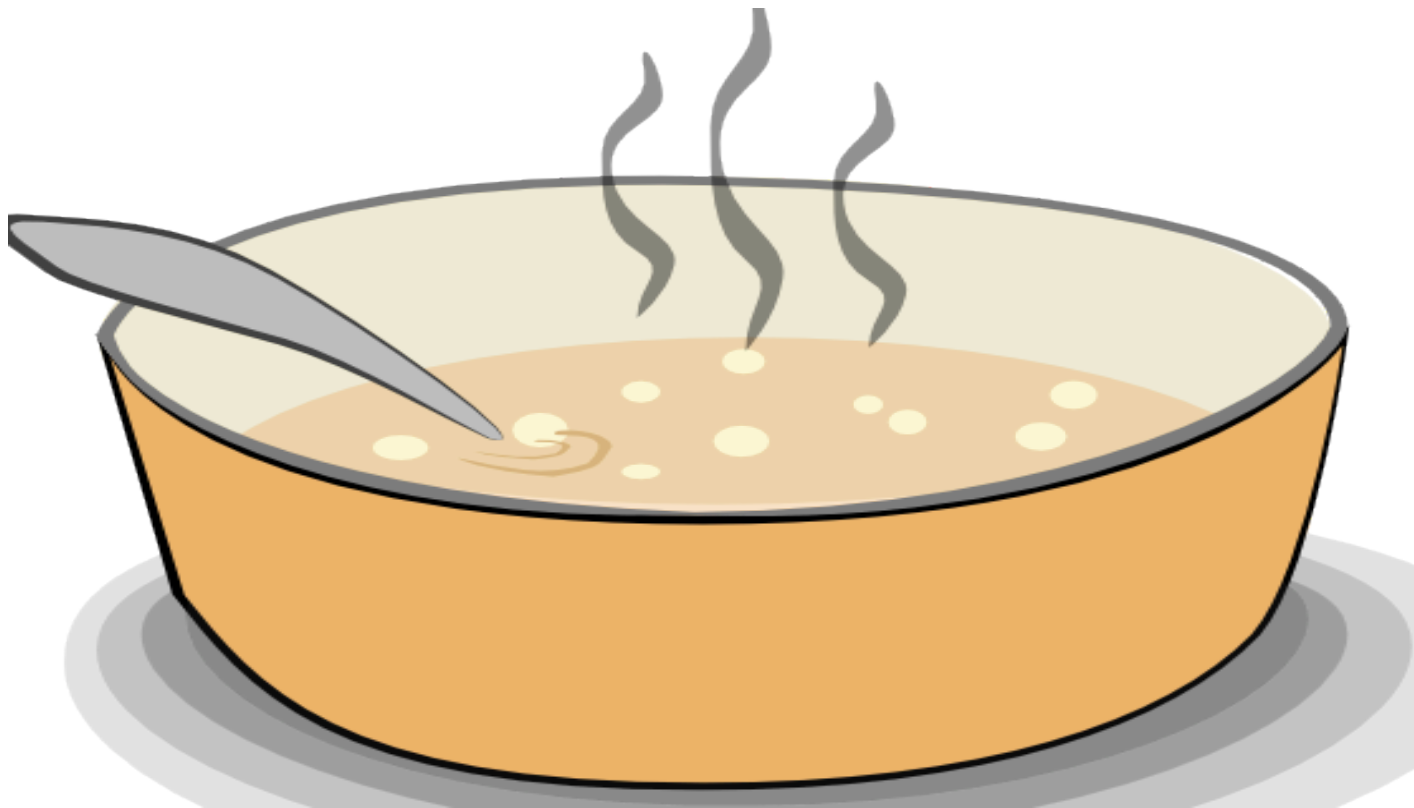
Members of

**Association of Public and Land-grant Universities
Academic Programs Section (APLU-APS)**

**Non Land-grant Agriculture and Renewable Resources
Universities (NARRU)**

Employment Opportunities Forecasts

**Old Family Recipe
Savor the Flavor!**





Employment Opportunities

**U.S. Department of Labor
Bureau of Labor Statistics (BLS)**

**Occupational Employment Data for 2012 With
Projections to 2022**

**Published in Monthly Labor Review
December, 2013**



Employment Opportunities

U.S. Department of Labor

Bureau of Labor Statistics (BLS)

Occupational Employment Projections to 2022

“Projected occupational employment is based on projected industry employment. BLS projections are a measure of how employment in industries and occupations grow if the economy were to operate at its full potential a decade from now.”



Employment Opportunities

U.S. Department of Labor

Bureau of Labor Statistics (BLS)

Occupational Employment Projections to 2022

“Not all occupations within an industry grow at the same rate, so BLS analysts make adjustments to occupational distributions within industries before arriving at final occupational projections.”



Employment Opportunities

U.S. Department of Labor

Bureau of Labor Statistics (BLS)

Occupational Employment Projections to 2022

“In addition to projecting occupational growth—that is, the number of new jobs expected—BLS provides estimates of the number of jobs that will need to be filled in each occupation as workers change occupations, retire, or leave the labor force and need to be replaced.”



Employment Opportunities

U.S. Department of Labor

Bureau of Labor Statistics (BLS)

Occupational Employment Projections to 2022

“Projections of job openings from replacement needs, when combined with projected job openings from occupational growth, provide a more complete picture of the opportunities jobseekers will encounter in the coming decade than is provided by projected employment alone.”



Employment Opportunities

BLS Occupational Employment Data for 2012 With Projections to 2022

- **ALL OCCUPATIONS: +10.5%**
- Management Occupations: 7.2%
- Business and Financial Occupations: 12.5%
- Computer and Mathematical Occupations: 18.0%
- Architecture and Engineering Occupations: 7.3%



Employment Opportunities

BLS Occupational Employment Data for 2012 With Projections to 2022

- Life, Physical, & Social Science Occupations: 10.1%
- Community and Social Service Occupations: 17.2%
- Education, Training and Library Occupations: 11.1%
- Healthcare Practitioner Occupations: 21.5%
- Protective Services Occupations: 7.9%



Employment Opportunities

BLS Occupational Employment Data for 2012 With Projections to 2022

- Sales and Related Occupations: 7.3%
- Farming, Fishing and Forestry Occupations: **-3.4%**
- Construction and Extraction Occupations: 21.4%
- Transportation Occupations: 8.6%
- Food Preparation and Serving Occupations: 9.4%



Employment Opportunities

BLS Occupational Employment Data for 2012 With Projections to 2022

- 2012 BLS National Employment Matrix Included 818 Occupations.
- Total Job Openings Were Projected for Each Occupation Due to Growth and Replacements During 2012-2022.



Employment Opportunities

Food, Agriculture, Renewable Natural Resources and Environment Occupations

Step #1

- Investigators selected 166 of the 818 BLS occupations in which college graduates with Food, Agriculture, Renewable Natural Resources, or Environmental Expertise would be expected to compete for jobs.
- For this study, college graduates were those having a baccalaureate or higher degree.



Employment Opportunities

Food, Agriculture, Renewable Natural Resources and Environment Occupations

Step #2

For each selected occupation, BLS projected job openings due to growth and replacements during 2012-2022 were divided by 10 to yield “Average Annual Openings.”



Employment Opportunities

Food, Agriculture, Renewable Natural Resources and Environment Occupations

Step #3

For each of the 166 selected occupations, investigators estimated the percentage of jobs that would require Food, Agriculture, Renewable Natural Resources, or Environmental Expertise.



Employment Opportunities

Food, Agriculture, Renewable Natural Resources and Environment Occupations

Step #3 – Example A

1. BLS Projected Openings for “Food Scientists and Technologists” During 2012-2022 – 8,500
2. Average Annual Openings – 850
3. Needed Expertise – Food, Agriculture..... 100%
4. Annual Job Openings For Report - 850



Employment Opportunities

Food, Agriculture, Renewable Natural Resources and Environment Occupations

Step #3 – Example B

1. BLS Projected Openings for “Civil Engineers”
During 2012-2022 – 120,100
2. Average Annual Openings – 12,010
3. Needed Expertise – Food, Agriculture..... 5%
4. Annual Job Openings For Report - 601



Employment Opportunities

Allocation to Occupational Clusters

Step #4

Projected job openings were allocated among the four occupational clusters.

Management and Business

Science and Engineering

Agricultural and Forestry Production

Education, Communication, & Governmental Services



Employment Opportunities

Allocation of “Food Scientists and Technologists” Among Occupational Clusters

Step #4 – Example A

1. Management and Business – 10%
2. Science and Engineering – 80%
3. Agricultural and Forestry Production – 0%
4. Education, Communication, and Governmental Services – 10%



Employment Opportunities

Allocation of “Financial Managers” Among Occupational Clusters

Step #4 – Example B

1. Management and Business – 60%
2. Science and Engineering – 20%
3. Agricultural and Forestry Production – 10%
4. Education, Communication, and Governmental Services – 10%



Graduates

National Center for Education Statistics (NCES)
U.S. Department of Education

“The National Center for Education Statistics (NCES) is the primary federal entity for collecting and analyzing data related to education.”



Graduates

National Center for Education Statistics (NCES)

**The Integrated Postsecondary Education Data System
(IPEDS)**

Classification of Instructional Programs (CIPS)

“The Classification of Instructional Programs (CIPS) provides a taxonomic scheme that supports the accurate tracking and reporting of fields of study and program completions activity.”



Graduates

National Center for Education Statistics (NCES)

**The Integrated Postsecondary Education Data System
(IPEDS)**

Classification of Instructional Programs (CIPS)

For this study, included data were for graduates who earned a baccalaureate or higher degree in U.S. public and private colleges and universities (Excludes for-profit institutions.)



Graduates

Qualified Graduates – Agriculture Programs

Step #1

Investigators selected 108 of the 1,848 instructional programs included in the NCES CIPS taxonomy.

01 – Agriculture, Agricultural Operations, and Related Services

03 – Natural Resources and Conservation

51 – Veterinary Medicine (Health Professions and Related Programs)

Selected instructional programs from other CIPS series, i.e., Agricultural Engineering, Plant Genetics, Agricultural Education.



Graduates

Qualified Graduates – Agriculture Programs

Step #2

For each of the 108 selected instructional programs, investigators estimated the percentage of graduates by degree level that would be expected to have Food, Agriculture, Renewable Natural Resources, or Environmental Expertise.



Graduates

Adjustments – Agriculture Graduates

Step #3

Bachelor's Graduates

2% Reduction – Do Not Enter Workforce

25% Reduction – Continue Education

Master's Graduates

19% Reduction – Continue Education

Doctoral Graduates

30% Reduction – Non-resident Aliens Return Home

Overall Adjustment

3% Increase – Growing Enrollments in Agriculture Programs



Graduates

Agriculture Graduates - Allocation to Occupational Clusters

Step #4

Graduates in the 108 Agriculture programs were allocated among the four occupational clusters.

Management and Business

Science and Engineering

Agricultural and Forestry Production

Education, Communication, and Governmental Services



Graduates

Allocation of “Crop Production” Graduates Among Occupational Clusters

Step #4 – Example A

1. Management and Business – 30%
2. Science and Engineering – 5%
3. Agricultural and Forestry Production – 60%
4. Education, Communication, and Governmental Services – 5%



Graduates

Allocation of “Ornamental Horticulture” Graduates Among Occupational Clusters

Step #4 – Example B

1. Management and Business – 70%
2. Science and Engineering – 5%
3. Agricultural and Forestry Production – 20%
4. Education, Communication, and Governmental Services – 5%



Graduates

Qualified Graduates – Allied Programs

Step #1

Investigators selected 228 of the 1,848 instructional programs included in the NCES CIPS taxonomy from the following series.

- 04 – Architecture and Related Services
- 09 – Communication, Journalism, and Related Programs
- 11 – Computer and Information Sciences
- 12 – Personal and Culinary Services
- 13 – Education
- 14 – Engineering



Graduates

Qualified Graduates – Allied Programs

Step #1

Investigators selected 228 of the 1,848 instructional programs included in the NCES CIPS taxonomy from the following series.

- 15 – Engineering Technologies
- 19 – Family and Consumer Sciences/Human Sciences
- 22 – Law
- 26 – Biological and Biomedical Sciences
- 30 – Multi-/Interdisciplinary Studies
- 31 – Parks, Recreation, Leisure, and Fitness Studies



Graduates

Qualified Graduates – Allied Programs

Step #1

Investigators selected 228 of the 1,848 instructional programs included in the NCES CIPS taxonomy from the following series.

40 – Physical Sciences

41 – Science Technologies/Technicians

44 – Public Administration and Social Service Professions

45 – Social Sciences

51 – Health Professions and Related Programs

52 – Business, Management, Marketing, and Related



Graduates

Qualified Graduates – Allied Programs

Step #2

For each of the 228 selected instructional programs, investigators estimated the percentage of graduates by degree level that would be expected to have Food, Agriculture, Renewable Natural Resources, or Environmental Expertise.



Graduates

Adjustments – Allied Graduates

Step #3

Bachelor's Graduates

2% Reduction – Do Not Enter Workforce

25% Reduction – Continue Education

Master's Graduates

19% Reduction – Continue Education

Doctoral Graduates

30% Reduction – Non-resident Aliens Return Home



Graduates

Allied Graduates - Allocation to Occupational Clusters

Step #4

Graduates in the 228 Allied programs were allocated among the four occupational clusters.

Management and Business

Science and Engineering

Agricultural and Forestry Production

Education, Communication, and Governmental Services



Graduates

Allocation of “Advertising” Graduates Among Occupational Clusters

Step #4 – Example A

1. Management and Business – 85%
2. Science and Engineering – 5%
3. Agricultural and Forestry Production – 0%
4. Education, Communication, and Governmental Services – 10%



Graduates

Allocation of “Mechanical Engineering” Graduates Among Occupational Clusters

Step #4 – Example B

1. Management and Business – 30%
2. Science and Engineering – 60%
3. Agricultural and Forestry Production – 0%
4. Education, Communication, and Governmental Services – 10%



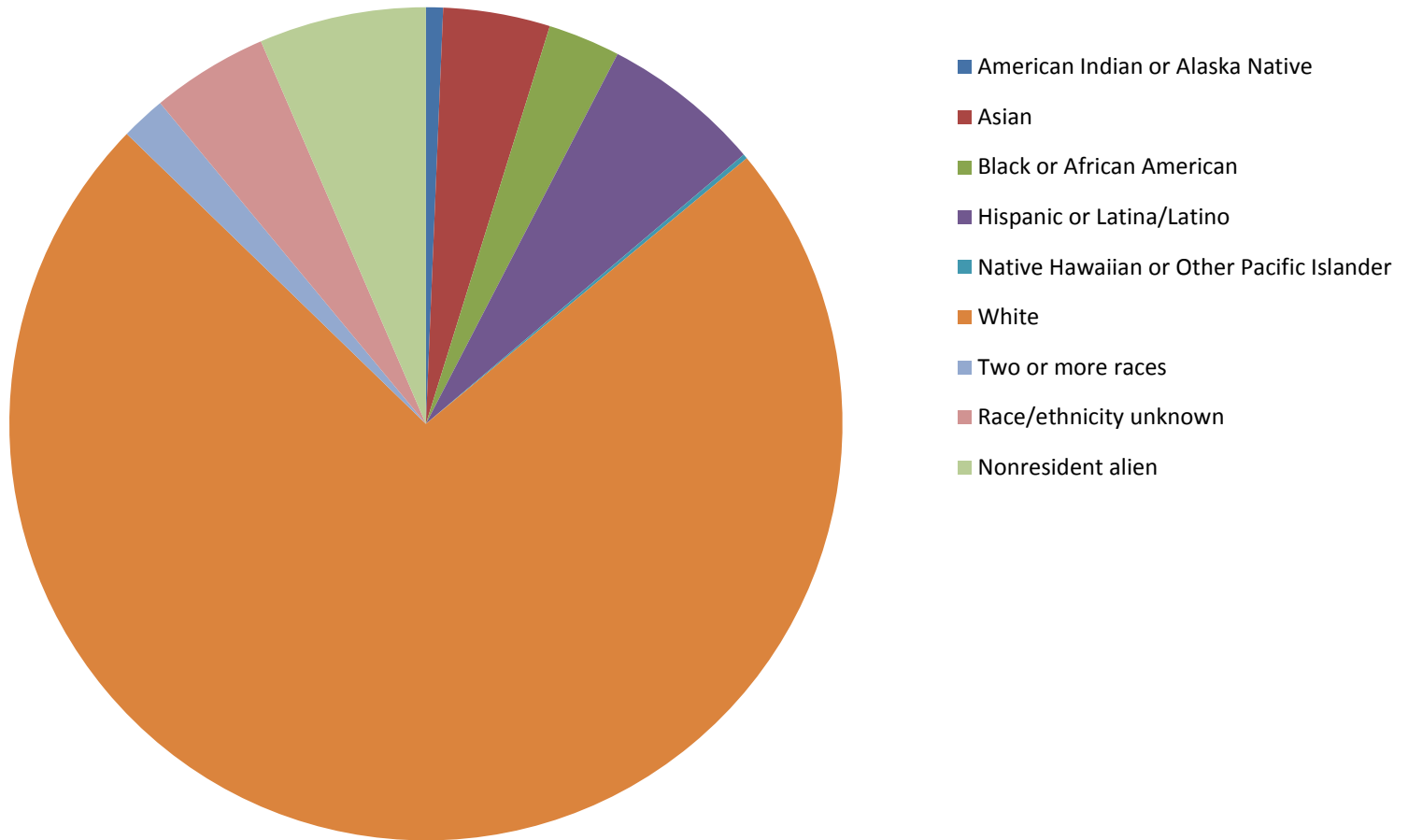
Graduate Ethnicity – 2012-13

Agriculture and Life Sciences, Forestry and Natural Resources, Veterinary Medicine

• American Indian/Alaska Native	0.66 %
• Asian	4.15 %
• Black or African American	2.80 %
• Hispanic or Latina/Latino	6.20 %
• Native Hawaiian/Pacific Islander	0.18 %
• White	73.25 %
• Two or More Races	1.75 %
• Race/Ethnicity Unknown	4.53 %
• Nonresident Alien	6.48 %

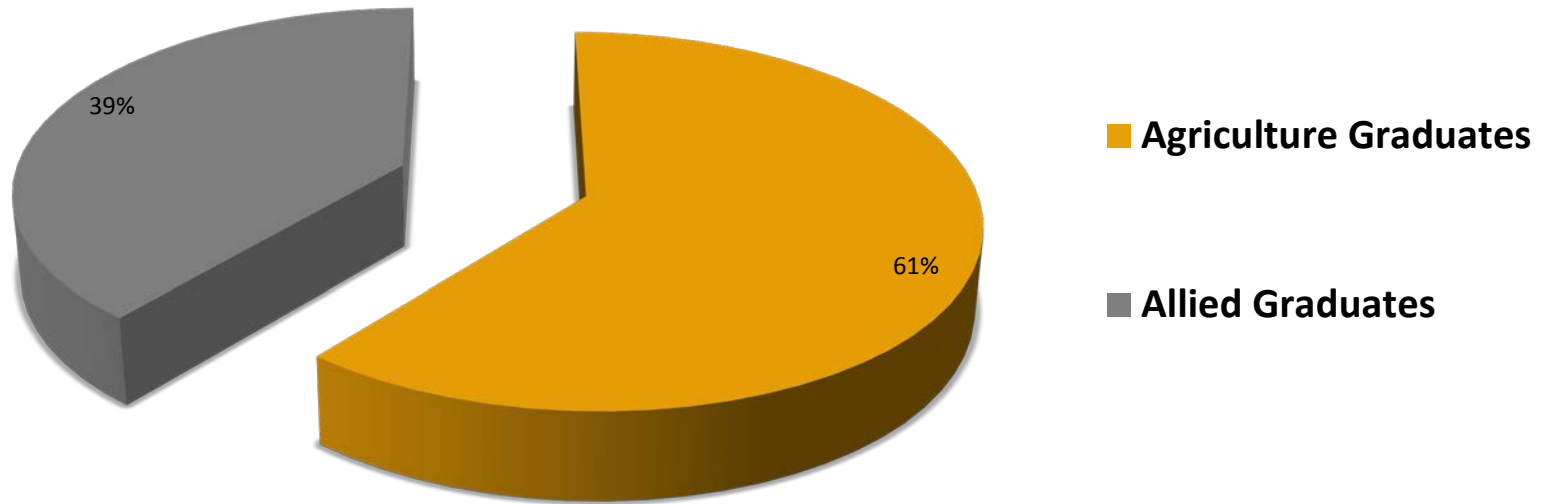
Source: National Center for Education Statistics

Graduate Ethnicity – 2012-13

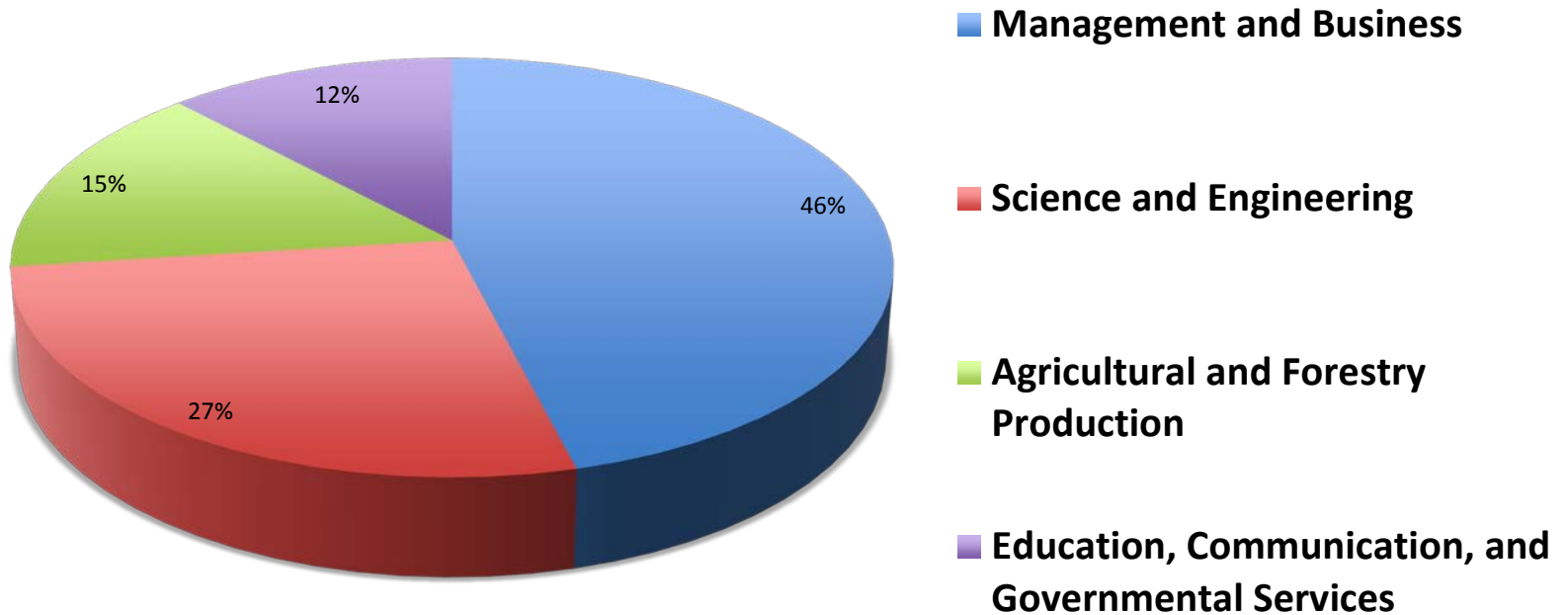


The Big Picture

U. S. - 57,900 Annual Opportunities



The Big Picture





The Big Picture

- BLS – 10.8% growth in U.S. labor force between 2012-2022.
- More than five percent growth in food, agriculture, renewable natural resource, and environment occupations is expected during 2015-2020.
- A more competitive market is expected in the next five years. Numbers of qualified graduates are expected to grow more rapidly than job openings.



The Big Picture

- Employers will continue to seek most qualified graduates either from agriculture, or allied disciplines.
- Specific skills and related employment experiences will continue to be most important in hiring decisions.
- Graduates with geographic mobility and a record of leadership experiences will have relatively more employment opportunities.



The Big Picture

Enough graduates will be available to fill job openings during 2015-2020, but employers will continue to find too few fully qualified graduates in some specialties, and too many in others.



Market Factors

- Macroeconomic conditions and retirements.
- Growing numbers of qualified agriculture and allied graduates.
- Consumer preferences for safe and nutritious food.

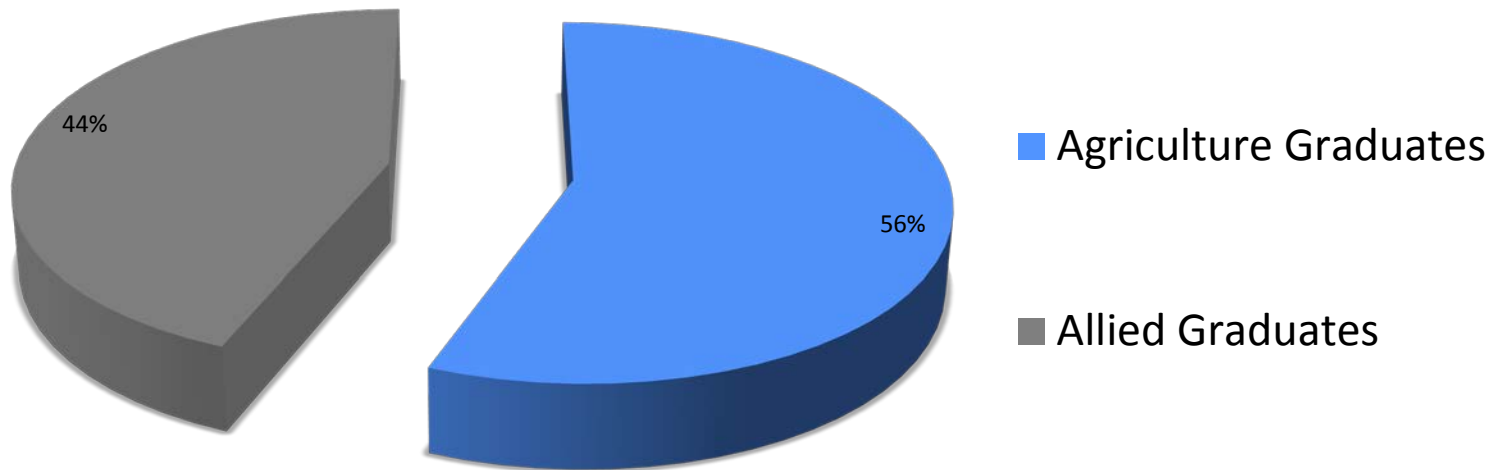


Market Factors

- Food, agriculture, natural resources, and environment public policy choices.
- Technology advancements in agriculture and renewable natural resources.
- Global market shifts in population, income, food, and energy.

Management and Business

26,700 Annual Opportunities





Management and Business

- Most bachelor's degree graduates will continue to enter sales and technical service jobs.
- New jobs are expected to remain stable or decline in the near term.
- Replacements for retirements will contribute largely to the market.



Management and Business

- Forest ecosystem management job market remains strong.
- New construction contributes to jobs in forest products and landscaping.
- Consumer shifts to fresh and organic products changes marketing strategies.

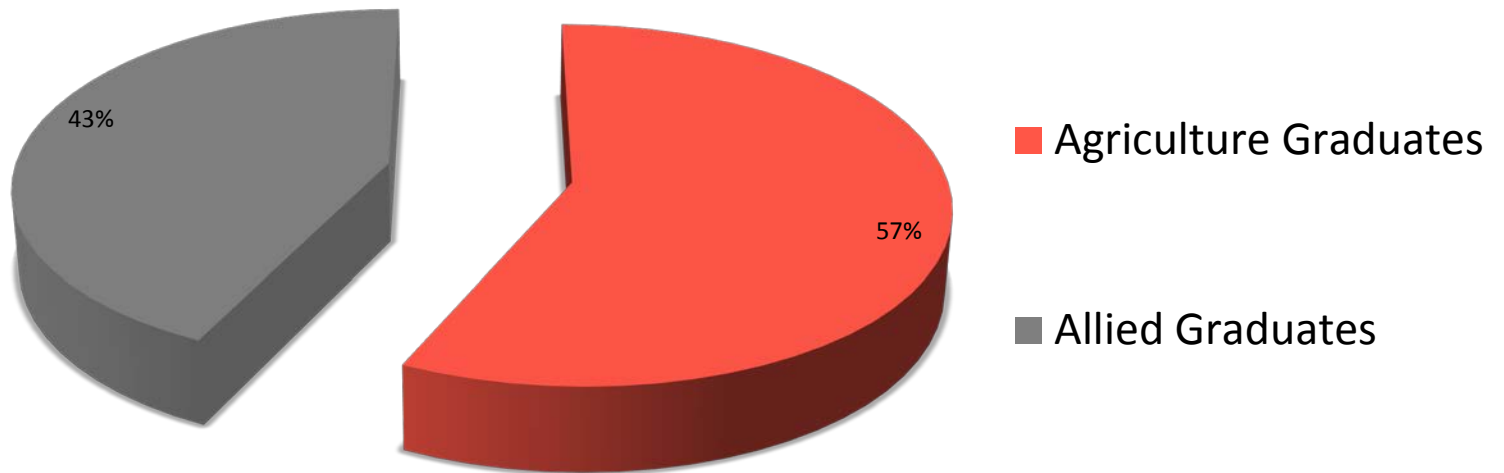


Management and Business

- Environmental consultants will be in demand to maintain environmental quality and comply with governmental regulations.
- Growing E-commerce will increase opportunities for graduates with online marketing and social media skills.

Science and Engineering

15,500 Annual Opportunities





Science and Engineering

- Continued strong demand for food scientists.
- Very strong employment market for plant sciences graduates.
- Water concerns heighten opportunities for water scientists, hydrologists, irrigation engineers.



Science and Engineering

- Continued challenges in meeting food animal veterinarian needs.
- Electronic applications in agriculture project good opportunities for computer specialists.
- More life science B.S. graduates seek health profession opportunities.

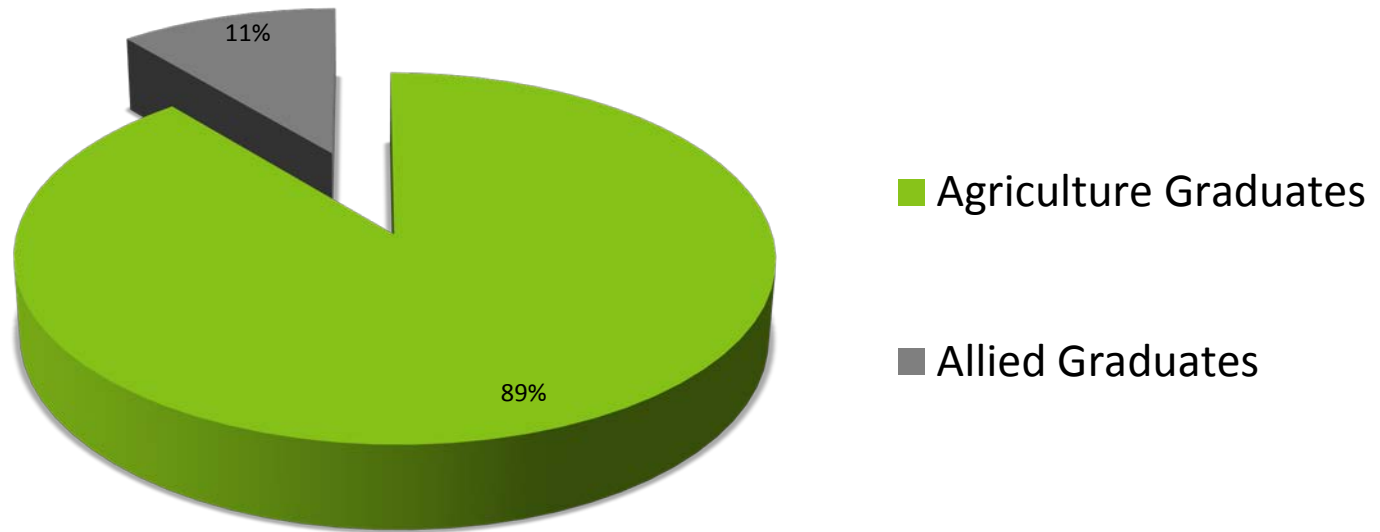


Science and Engineering

- Graduates with environmental expertise will exceed job opportunities.
- Oversupply of Animal Science graduates except food animal production jobs.
- Oversupply of Wildlife Science and Management bachelor's graduates.

Agricultural and Forestry Production

8,500 Annual Opportunities





Agricultural and Forestry Production

- Higher percentage of openings will require B.S. or higher degree.
- Good opportunities for forest management positions.
- More fresh fruit, vegetable, and organic operations near population centers.



Agricultural and Forestry Production

- Good opportunities for poultry and swine production managers.
- Precision agriculture specialists will see strong employment market.
- Strong job market for certified crop advisors who work with growers.

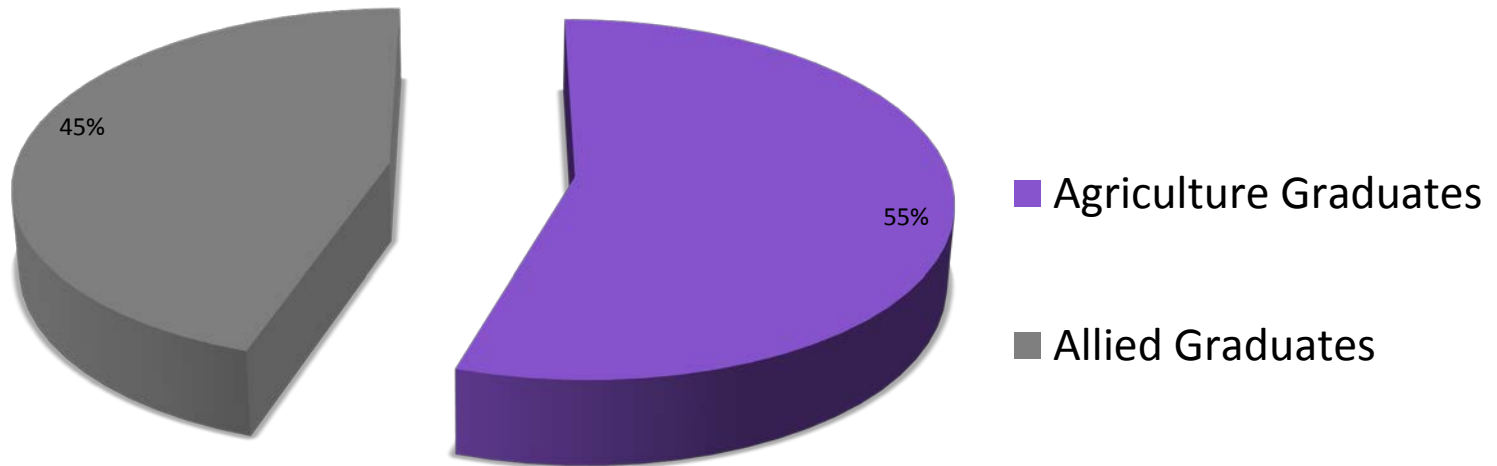


Agricultural and Forestry Production

- Good opportunities for agricultural management consultants who confirm production standards are met by growers.
- Graduates in animal specialties will continue to outnumber those in crop production and management.

Education, Communication, and Governmental Services

7,200 Annual Opportunities





Education, Communication, and Governmental Services

- Excellent job market for high school Agricultural Science and Business teachers.
- Good opportunities for naturalists and forest recreation graduates.
- Food safety priorities will maintain strong market for agricultural inspectors.



Education, Communication, and Governmental Services

- Growing community college enrollments will provide market for agricultural and environmental instructors, perhaps part-time.
- Good opportunities - urban foresters.
- Increased public sector jobs in food safety, water management, and environmental quality.



Education, Communication, and Governmental Services

- A major challenge for land-grant agriculture colleges to employ faculty who can prepare B.S. graduates for jobs in management, business, and agricultural production.
- Best opportunities for communication graduates will be in social media and public relations.