

AGRICULTURAL JOB MARKET REPORT

September 2023 Report



PURDUE
UNIVERSITY

Agricultural Economics
COLLEGE OF AGRICULTURE

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Executive Summary

PURPOSE

Purdue University's Department of Agricultural Economics started collecting data on agricultural job postings during the summer of 2021. This data is collected every 4 weeks, and this report represents an overview of the agricultural job market over time. The data extends from June 2021 to September 2023. The Agricultural Job Market Report provides a measurement of the current state of agricultural job openings.

ABOUT THIS REPORT

Google's job search engine pulls job postings from thousands of separate job boards. These job boards can be company specific as well as common job posting sites like LinkedIn and Glassdoor. On Google's job search engine, LinkedIn is the most popular job board for agricultural jobs that are found in the data.

JOB TRENDS

Agricultural Job postings were collected 14 times between September 7, 2022, and September 6, 2023. On average, there are 1,018 new job openings every four weeks. There were 989 new job openings on Google between August 12, 2023, and September 6, 2023. Over the last 12 months, job postings peaked in June 2023, and job openings and new job openings peaked in May 2023. New job openings have been below the 12-month average for the past three months.

SALARY

The average agricultural job salary over the past 18 months is \$58,685, which is below the average salary for all jobs in the United States, according to Forbes. Jobs in sales, academics, and lending and finance are among the highest paid in agriculture. In terms of regional salaries, remote jobs have the highest average salary, followed by the West.

DESCRIPTION ANALYSIS

Agricultural jobs require a fair amount of experience. It is calculated that 83% of agricultural job postings mention experience in some form. Considering types of job openings, engineering, business administration, education, sales, and lending and finance were the top five categories.

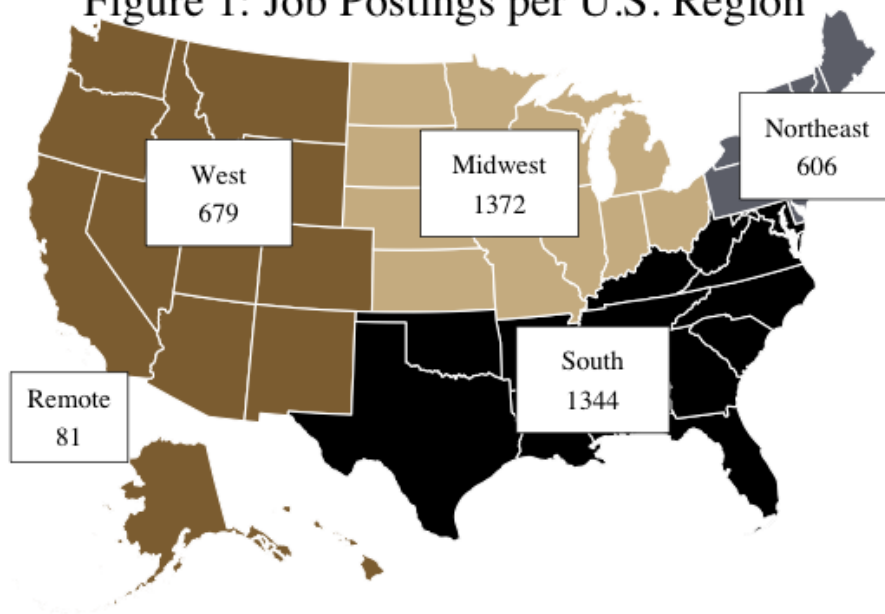
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Job Postings

In the report, “job posting” refers to any separate occurrence of a job advertisement for an individual job. Any representation of a single specific job opportunity of a company will always be phrased as a “job opening”.

Some companies have existing career pages on their website but continue to post to job boards, like LinkedIn and ZipRecruiter. Companies post to multiple job boards to cast a wider net for potential hires. Figure 1 illustrates the amount of job postings for each region of the United States. There were 4,082 total job postings on September 6, 2023. The most jobs postings were in the Midwest and South, with each region including 33% of the total job postings. Relative to September 2022, job postings in all four regions and remote have increased. The degree of increase varies across the regions. Job postings are 178%, 125%, 81%, 55% and 11% higher in the Northeast, Remote, Midwest, South, and West, respectively.

Figure 1: Job Postings per U.S. Region

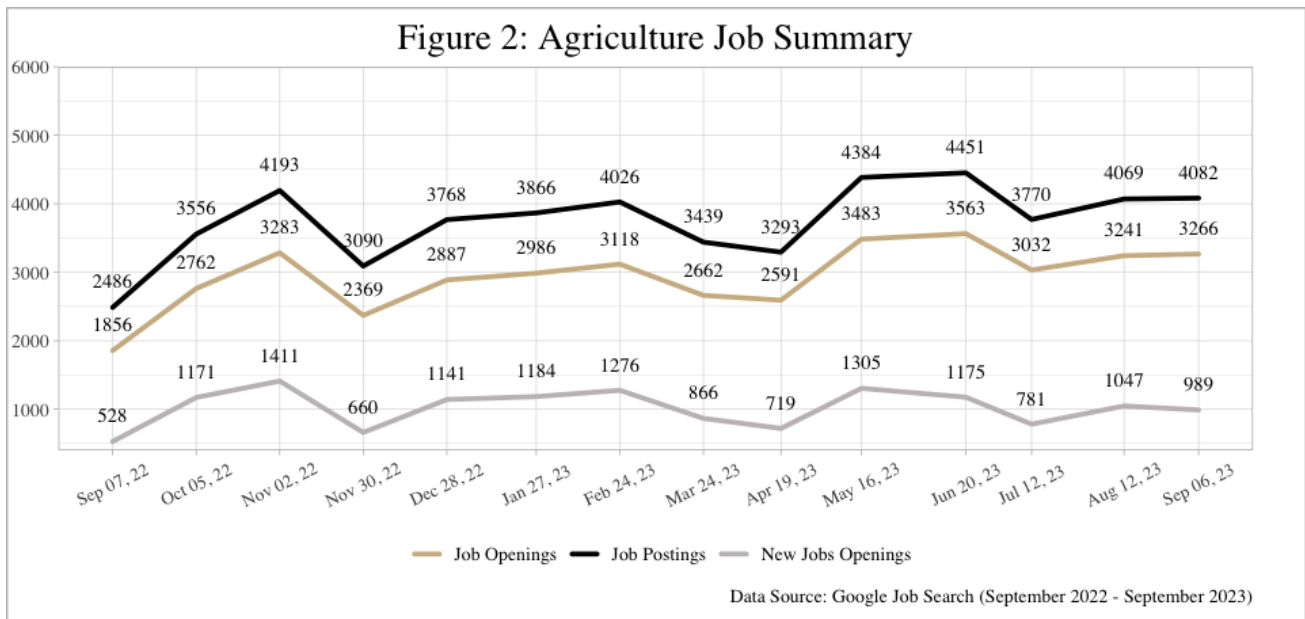


Data Source: Google Job Search (September 2023)

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Job Trends

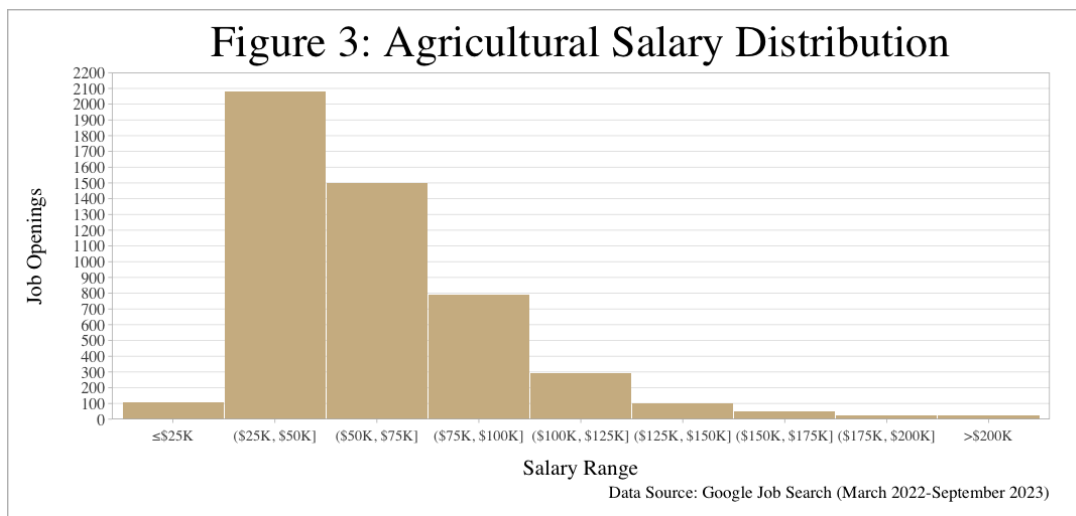
Figure 2 represents one year's worth of job trends for each month from September 2022 to September 2023. On average, around 1018 new job openings are posted every four weeks. Job posting and openings have generally increased across the one-year period with 64% and 76% increases, respectively. November 2022 and March, April, and July 2023 were the only months that job postings and openings decreased. New job openings have also increased over the past year by 87%, but there has been more variation in month to month increases and decreases. The most recent trends depicted are two straight months of increases in job postings and openings and one month of decreasing new job postings.



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Salary

The national median salary computed from the data was \$53,258/year, and the average salary was \$58,685/year. It is important to note that only 20% of job openings included salary information. Figure 3 illustrates the distribution of salary among agricultural job openings. According to ZipRecruiter, the national average salary for agricultural related jobs is \$49,075/year. The average salary for all occupations is \$59,482/year, according to Forbes.



SALARY BY CATEGORY

The distribution of salaries varies across the different subsectors of agricultural jobs, as shown in Table 1. Jobs in sales (\$71,573/year), academics (\$69,488/year), and lending and finance (\$65,640/year) have the highest average salary. Non-specialized work and farming had the lowest average income with annually salaries of \$45,140 and \$45,623, respectively.

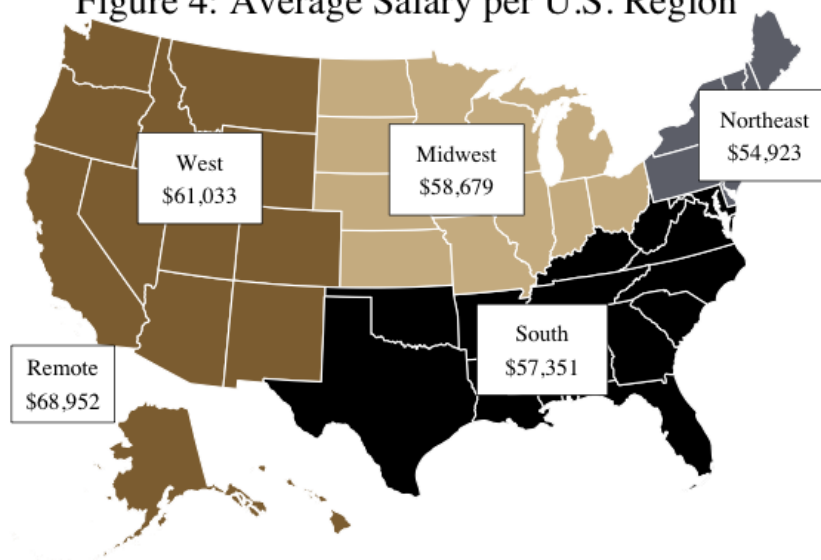
Table 1 Job Category by Title	Average Salary	Median Salary
Academic	\$69,488	\$66,964
Agronomy	\$60,608	\$56,369
Animal Science	\$59,030	\$51,836
Business		
Administration	\$60,902	\$55,535
Economics	\$59,614	\$51,495
Education	\$57,239	\$55,475
Engineering	\$64,655	\$60,775
Farming	\$45,623	\$36,400
Food Science	\$56,068	\$49,910
Lending and Finance	\$65,640	\$61,096
Natural Resources	\$55,156	\$50,000
Nondescript Titles	\$53,950	\$49,920
Research	\$52,457	\$45,760
Sales	\$71,573	\$70,000
Non-Specialized Work	\$45,140	\$41,600
Google Job Search (March 2022- September 2023)		

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SALARY BY REGION

Average salaries vary by region. Figure 4 illustrates the variation in average salaries across the U.S. Fully remote jobs have the highest listed salary at \$68,952/year. The West has the 2nd highest average salary listed in job postings at \$61,033/year, followed by the Midwest at \$58,679/year. The fourth highest average salary by region is the South at \$57,351/year, followed by the Northeast at \$54,923/year.

Figure 4: Average Salary per U.S. Region



Data Source: Google Job Search (March 2022-September 2023)

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Description Analysis

KEYWORDS

The data can be grouped by mentions within job descriptions. Table 2 reports the percent of job openings that include each word or some variation of it. The top 5 terms are farming, natural resources, agronomy, sales, and economics.

Table 2 Keywords	Job Openings that Mention
Academic	7.20%
Economics	27.10%
Ag Education	7.10%
Engineering	19.00%
Sales	48.60%
Agronomy	49.70%
Animal Science	22.40%
Farming	66.00%
Food Science	19.40%
Natural Resources	51.00%
Google Job Search (September 2023)	

REQUIRED SKILLS

Table 3 shows the average percentage of mentions for specific job requirements. Experience is required by 83% of jobs, while over 50 percent of jobs also require leadership, communication, education, and travel. The required skills and experiences are found across multiple different subsectors of agricultural jobs. Looking back to September of 2022, requirements across agricultural job postings have changed in the past year. Among requirements that have become more common are travel, remote work, and programming. Education and leadership were the requirements that saw their mentions decrease the most between September 2022 and September 2023.

Table 3 Requirements	Job Openings that Mention
Communication	67.80%
Critical Thinking	17.20%
Data	26.50%
Education	59.20%
Experience	83.60%
Leadership	70.60%
Microsoft	39.00%
Public Speaking	32.90%
Programming	11.00%
Quantitative	29.40%
Remote Work	14.40%
Teamwork	48.40%
Travel	58.40%
Google Job Search (September 2023)	

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DESIRED EDUCATION

Table 4 reports the percent of jobs postings in agriculture that mention each desired level of education by applicants. To be included, the educational term must be explicitly written in a job description. Generally, a low share of agricultural jobs indicate a required education. According to Table 4, a high school degree, the most cited degree requirement, is only mentioned in 16.3% of agricultural job postings.

Table 4	Job Openings that
Desired Education	Mention
High School	16.30%
Associates	2.40%
Bachelors	14.40%
Masters	8.10%
PhD	6.40%
Google Job Search (September 2023)	

JOB BENEFITS

The key terms related to job benefits are in Table 5. These include the broad terms of benefits, diversity, equal opportunity, tuition reimbursement, and 401(K). In the same way companies may not post salaries with online listings, they may also not report all the relevant benefits. These numbers should serve as guides to understand what is being displayed in job descriptions but are unlikely to fully capture the benefit packages offered by agricultural employers. We can see that most agricultural job postings use the general term “benefits” in the description, but few references specific benefits such as 401(K) and tuition reimbursement. Additionally, 83% of jobs included mention of equal opportunity.

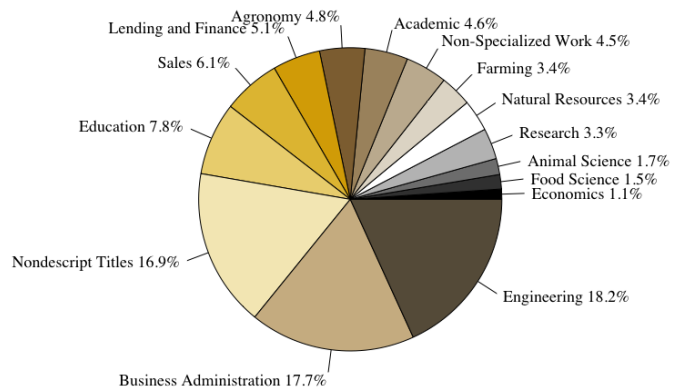
Table 5	Job Openings that
Benefits	Mention
Benefits	64.80%
Diversity	27.10%
Equal Opportunity	83.10%
Tuition Reimbursement	6.40%
401(K)	8.40%
Google Job Search (September 2023)	

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JOB CATEGORIES

Jobs can be classified based upon terms written in job posting titles. The pie chart in Figure 5 shows the breakdown of agricultural job categories from March 2022 to November 2023. The most common job types are engineering (18%), business administration (18%), education (8%), and sales (6%). Job titles that could not be classified make up nearly 17% of agricultural job postings.

Figure 5: Job Categories by Keywords in Title

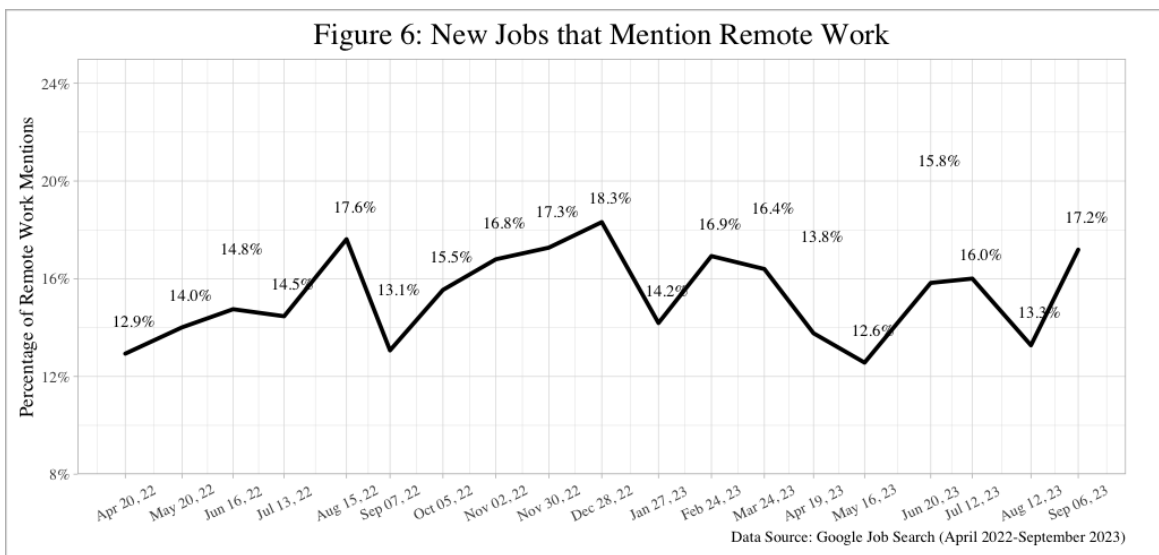


Data Source: Google Job Search (March 2022-September 2023)

REMOTE WORK

At the beginning of 2020, the Covid-19 pandemic disrupted in-person and office-based work. To slow the spread, companies that were able to work remotely pushed for the safer alternative of tele-work. Though the pandemic has ended, the benefits of and opportunity for remote work have continued. Figure 6 depicts the percent of new jobs in each collection that mention remote work. Mentions of remote fluctuate from collection to collection but have been between 12.6% and 18.3% since April 2022.

Figure 6: New Jobs that Mention Remote Work

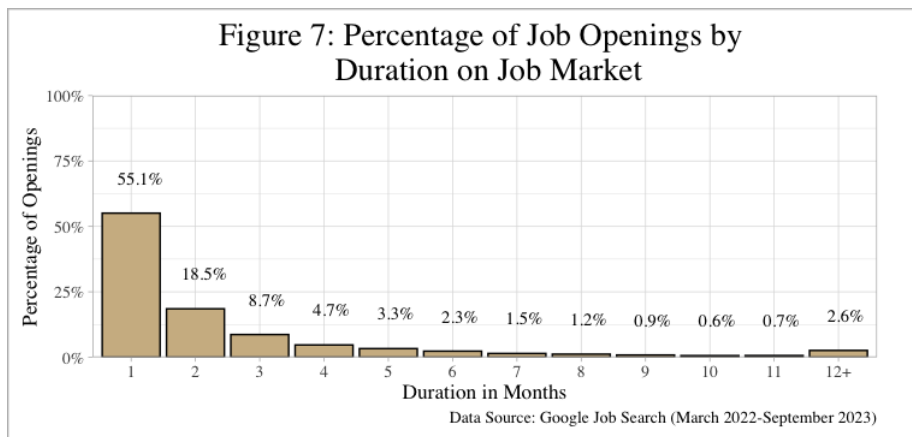


Data Source: Google Job Search (April 2022-September 2023)

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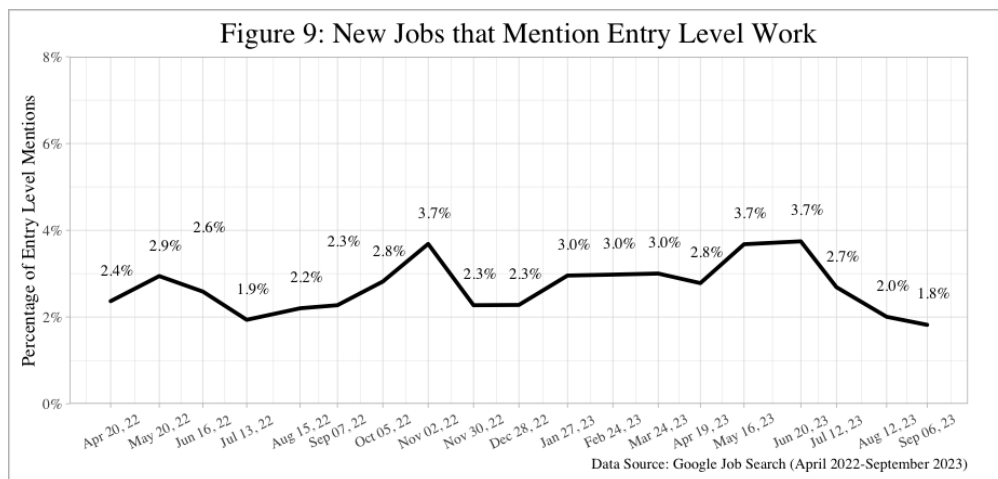
DURATION ON JOB MARKET

The amount of time that a job opening is listed can be an indicator of how fast agricultural jobs are filled and how long agricultural employers search for potential candidates. Figure 7 shows the duration of job openings on the job market over the past 18 months. 55% of agricultural jobs are removed from job posting sites within one month, while 82% of job opening have been removed by the third month.



NEW ENTRY LEVEL OPENINGS

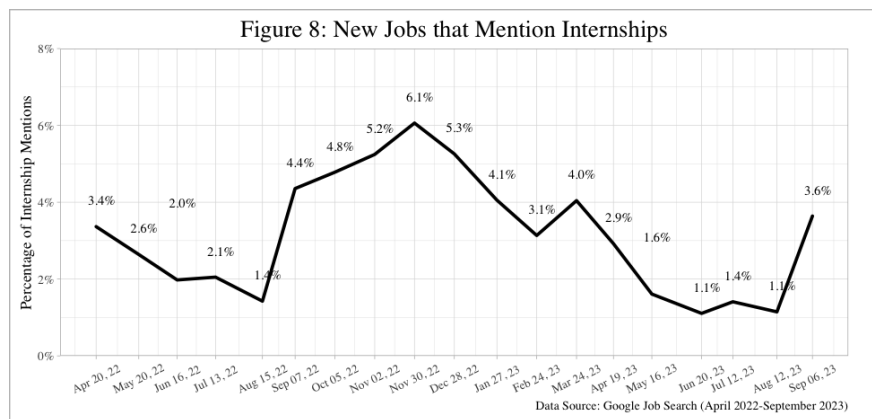
The percent of new jobs that mention entry level work since April 2022 is shown in Figure 9. Between April 2022 and September 2023, between 1.8% and 3.7% of new postings have mentioned entry level work. 3.7% of new jobs postings have mentioned entry level work as recently as May and June of 2023. Since these two months, we have seen three straight months of decreases in entry level work leading to the 18-month low in September 2023.



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NEW INTERSHIP OPENINGS

Internships are often filled by current college students that are looking to gain experience for their future career or meet a degree requirement. As a result, these types of job openings often follow the academic calendar. Figure 8 shows the percent of new jobs that mention internship between April 2022 and September 2023. Internship mentions are cyclical, increasing in the fall as companies seek students to employ and slowly decrease as the summer positions are filled. Most recently, internship mentions have increased from 1% to 3% from August to September 2023 as internship positions for the year have been posted.



Appendix

DATA COLLECTION

For this research, data was collected through Google's job search engine utilizing an Application Programming Interface (API) provided by SerpApi. The data collected for the report includes job title, company name, description, salary (if posted), posting date, and original job board site name.

Not all online job postings appear on Google's job search engine and as a result the data discussed in the report should be treated as a sample of job openings existing within the agriculture industry. Indeed.com, the number 1 job site in the world, does not share job posting data with Google. Google's job search engine represents only a fraction of jobs posted online. Job postings can be posted on multiple job boards such as LinkedIn, Glassdoor, as well as company websites that allow Google's Cloud Talent Solution to analyze their job postings and display them on Google's job search engine.

Job postings that are available on Google's job search engine are curated to best fit the search terms of the user. The data in this report was collected using a general search term of "agriculture". Data presented in this report could impose bias that is specific to Google's job search engine data. Although possible, we believe the data collected is valuable for industry employers as a metric for comparing company hiring to the agricultural industry. Therefore, this report is an analysis of Google's data and is not fully representative of the agricultural job market.

Note that not all online job postings appear on Google's job search engine. Job postings can be posted on multiple job boards such as LinkedIn, Glassdoor, as well as company websites that allow Google's Cloud Talent Solution to analyze their job postings and display them on Google's job search engine. Job postings that are available to Google's Cloud Talent Solution are curated to best fit the search terms of the user. For this study, the search term included: "agriculture." This allows for a broad variety of jobs to be collected that exist within the agricultural job market. The data discussed in this report represents all job postings in the United States collected from Google's job search engine from June 2021 to November 2022. Google's job search engine is a conglomerate of multiple online job boards. Within the data, no jobs were collected from Indeed.com. Indeed.com does not allow Google access to their job board unlike other popular job sites. Google must be granted access to a company's job

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posting before advertising on Google's job search engine. Many job openings appear on multiple job boards at a given time to get more advertising to potential employees.

Google's job search engine hosts thousands of job boards' data. Due to the immense amount of job boards available, job advertising is a competitive market. Companies seeking premium talent should post to the more popular job boards which produce more traffic.

DESCRIPTION ANALYSIS

From the data, each job posting has a description. Text mining was used to pull information from these descriptions, and it is possible to quantify the amount of mentions of specific characteristics. We were able to extract salary if not already mentioned, subsector information, requirements, and education. The categories were found using the "bag of words" technique. A list of words was created to represent any similar phrases and synonyms that represent a characteristic of interest. For example, quantitative skills would be marked as appearing in a job posting if terms appear in the description such as "quantitative", "analysis", "prediction", "mathematics", and "statistics." These terms are represented as nouns, verbs, and adjectives to catch all forms of context that might be represented in written language. Descriptions are then searched to evaluate if any of these terms were mentioned. If a term was mentioned once or more, the description was tallied as mentioning those specific characteristics.

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Keywords (Related to Table 2)	Word List
Academic	Company name must contain "college", "university" and Description must contain "professor", "dean", "university", "academic"
Economics	"ag economics", "agriculture economics", "economic", "ag business", "agricultural business", "agri-business", "econometric", "market", "market research", "market analysis", "loan", "credit", "lending"
Ag Education	"ag education", "agricultural education", "ag ed", "extension educator", "ffa", "future farmers of america", "4-h", "ag teacher", "agricultural teacher"
Engineering	"ag engineering", "agricultural engineering", "ag systems management", "agricultural systems management", "asm", "mechanic", "diesel mechanic"
Sales	"ag sales", "agricultural sales", "sales", "sell", "customer", "account", "seller", "buyer", "selling", "buying", "commission"
Agronomy	"agronomy", "agronomist", "corn", "soybeans", "soil", "seed", "crop", "crop adviser", "row crop"
Animal Science	"animal science", "animal", "veterinarian", "sheep", "cattle", "dairy", "swine", "pig", "pork", "beef", "livestock", "breed", "poultry", "equestrian", "horse"
Farming	"farming", "farmhand", "planting", "plant", "harvest", "harvester", "farm", "forage", "combine", "farmer"
Food Science	"food science", "food production", "meat packing", "butcher", "food distribution", "food handling", "food processes", "food product", "meat", "produce"
Natural Resources	"natural resources", "conservation", "wildlife", "environment", "environmental", "ecosystem", "forest", "raw materials", "nature", "energy", "pollution", "renewable"

Requirements (Related to Table 3)	Word List
Communication	"communication", "communicate", "talk", "call", "email", "explain", "present", "speak"
Critical Thinking	"critical thinking", "problem solving", "analysis", "deliberate", "brainstorm", "reasoning"
Data	"data", "data analysis", "big data", "data analyst", "data wrangling", "data collection"
Education	"degree", "degrees", "college", "graduate", "undergrad", "doctorate", "phd", "bachelor", "bachelors", "education", "gpa"
Experience	"work experience", "experience", "training", "prior job", "familiarity", "practice", "knowledge", "background", "exposure to", "understanding of"
Leadership	"leadership", "lead", "leading", "leader", "manager", "management", "mentor", "supervision", "supervisor", "supervise"
Microsoft	"excel", "spreadsheet", "microsoft", "word", "powerpoint", "outlook"

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Public Speaking	"public speaking", "speaking", "speech", "speeches", "speak", "present", "presentation"
Programming	"coding", "code", "python", " r ", "sql", "java", " c ", "computing", "algorithm"
Quantitative	"quantitative", "analysis", "analyze", "analyst", "insight", "predict", "prediction", "predictive", "math", "mathematics", "statistics", "statistical", "optimization", "optimize", "regression"
Remote Work	"remote", "remote working", "home office", "work from home", "work at home"
Teamwork	"collaboration", "team", "teams", "teamwork"
Travel	"travel", "drive", "driving", "fly", "flying"

Desired Education (Related to Table 4)	Word List
High School	"high school"
Associates	"associate's", "associate degree", "associates's degree"
Bachelors	"bachelors", "bachelor's degree", "bachelor degree"
Masters	"masters", "master's degree", "master degree", "grad school", "gradschool", "graduate degree", "advanced degree"
PhD	"phd", "p.h.d", "ph.d", "doctorate", "doctoral degree"

Other Requirements (Related to Table 5)	Word List
Benefits	"medical", "dental", "vision", "ad&d", "ad and d", "accidental death and dismemberment", "std", "short term disability", "short-term disability", "ltd", "long term disability", "long-term disability", "vacation", "holiday", "disability", "health insurance", "health savings account", "life insurance", "paid time off", "pto", "referral program", "retirement planning", "retirement"
Diversity	"diverse", "diversity"
Equal Opportunity	"equal opportunity", "without regard", "religion", "sex", "color", "age", "race"
Tuition Reimbursement	"tuition"
401(K)	"401k", "401 k", "401(k)"

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Category (Related to Figure 5 and Table 1)	Word List
Academic	"professor", "dean", "academic", "college", "adjunct", "tenure", "chair", "post doc", "postdoc", "faculty"
Agronomy	"agronomy", "agronomist", "corn", "soybeans", "soil", "seed", "crop", "grain", "cultivation", "greenhouse", "irrigation", "appraiser", "horticulture", "fertilizer", "pesticide", "fungicide", "herbicide", "applicator", "sprayer", "botanist"
Animal Science	"animal science", "animal", "veterinarian", "veterinary", "sheep", "cattle", "dairy", "swine", "pig", "pork", "beef", "livestock", "breed", "poultry", "equestrian", "horse", "bovine", "ranch", "farrowing", "feedlot", "grazing", "dairies", "milking", "egg gatherer", "herdsman", "herdsperson"
Business Administration	"business", "market", "administration", "manager", "management", "admin", "program tech", "supervis", "retail", "coordinator", "operation", "purchas", "bookkeeper", "human resource", "customer service", "receptionist", "executive assistant", "product specialist", "recruit", "executive director", "inventory specialist", "it specialist", "legal", "attorney", "law", "corporate", "commercial", "secretary", "consultant", "trader"
Economics	"economic", "economist", "econometric", "statistician", "risk", "economy", "commodity", "price", "pricing", "policy specialist", "policy analyst", "policy"
Education	"ag education", "agriculture education", "agricultural education", "educator", "teach", "teacher", "class", "classroom", "ffa", "4-h", "4h", "ag teacher", "teaching", "extension educator", "future farmers of america", "ext agent", "extension"
Engineering	"engineering", "engineer", "mechanic", "diesel", "equipment", "service tech", "service manager", "maintenance tech", "production tech", "electrical tech", "precision tech", "repair", "construction", "mechan", "weld", "precision", "digital ag", "technology"
Farming	"farming", "farmhand", "planting", "plant", "harvest", "harvester", "farm", "forage", "combine", "farmer"
Food Science	"food science", "food production", "meat packing", "butcher", "food distribution", "food handling", "food processes", "food product", "meat", "produce", "food", "nutrition", "sugar"

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Lending and Finance	"loan", "credit", "lender", "lending", "bank", "finance", "accountant", "accounting", "tax", "budget", "financial", "investment", "insurance", "account", "underwriter", "audit", "collateral"
Natural Resources	"natural resources", "conservation", "wildlife", "environment", "environmental", "ecosystem", "forest", "tree", "raw materials", "nature", "energy", "pollution", "renewable", "fire", "climate", "natural", "sustainable", "resources", "surveyor", "fish", "microbiologist", "geologist", "biologist", "biological"
Nondescript Titles	All jobs that do not match any of the other categories. Top 2 titles shown include: "Agriculture Technician" and "Agricultural Program Specialist"
Research	"research", "laboratory", "science", "scientist", "chemistry", "chemist", "lab", "chemical"
Sales	"sale", "seller", "buyer", "selling", "buying"
Non-Specialized Work	"operator", "manufacture", "package", "production", "transport", "driving", "driver", "cdl", "labor", "seasonal", "worker", "forklift", "process", "inspector", "investigator", "pest control", "security", "yard person", "quality assurance", "clean", "mow", "lawn", "assembler", "helper", "warehouse", "landscape", "landscaping", "yard"

States in Each Region from Figure 1 and 4

Midwest	IN, IL, MI, OH, WI, IA, KS, MN, MO, NE, ND, SD
Northeast	CT, ME, MA, NH, RI, VT, NJ, NY, PA
South	DE, FL, GA, MD, NC, SC, VA, WV, AL, KY, MS, TN, AR, LA, OK, TX, DC
West	AZ, CO, ID, NM, MT, UT, NV, WY, AK, CA, HI, OR, WA

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