

AGRICULTURAL JOB MARKET REPORT

January 2022 Report



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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 monthly and this report represents an overview of the agricultural job market over time. The current life span of the data extends from June 2021 to December 2021. The Agricultural Job Market Report creates 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.

SALARY

The median agricultural job salary is \$53,433, slightly higher than the median salary of \$52,052 for all jobs in the United States. About 12% of agricultural job postings report the salary for potential candidates to view.

JOB TRENDS

On average there are around 1,476 new agricultural job openings posted each month. Most job openings stay on the market for one month, though some remain unfilled after multiple months.

DESCRIPTION ANALYSIS

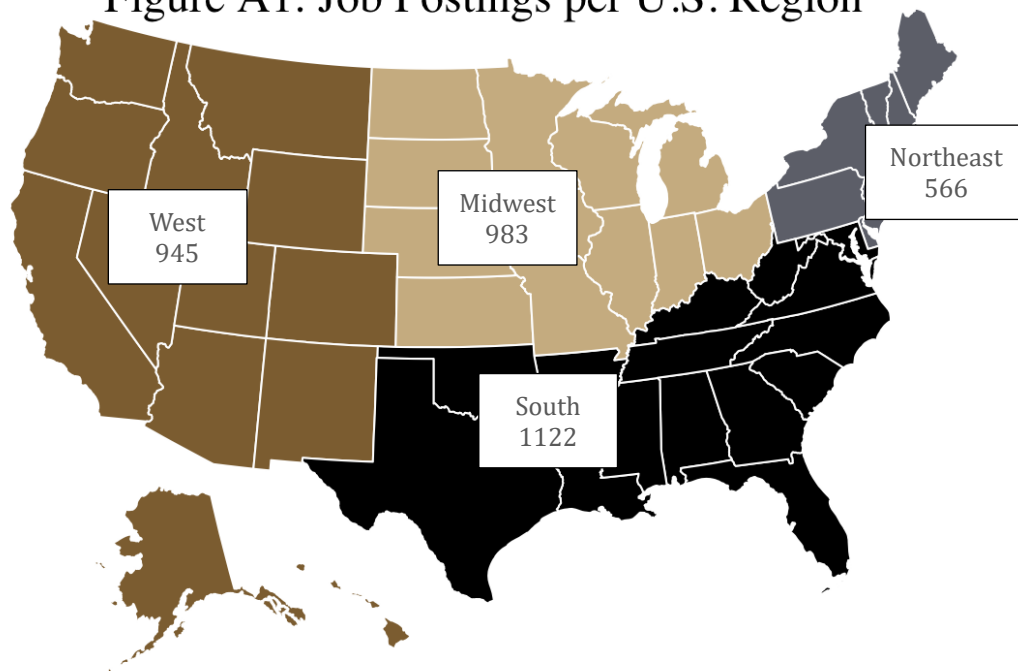
Agricultural jobs require a fair amount of experience. It is calculated that 85.5% of jobs in the data mention experience in some form. In terms of job openings, the top 5 agricultural subsectors are business administration, engineering, sales, lending and finance, and agronomy. Overlap of knowledge in subsectors is also evident. Terms related to farming, natural resources, sales, agronomy, and economics appear often in the same job postings.

Job Postings

In this 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 employers post to several job boards and it was conservatively estimated that the average job opening is advertised through 1.3 separate job postings. 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 A1 illustrates the amount of job openings for each region of the United States. As of December 29th, 2021, there were 3,691 agricultural job postings.

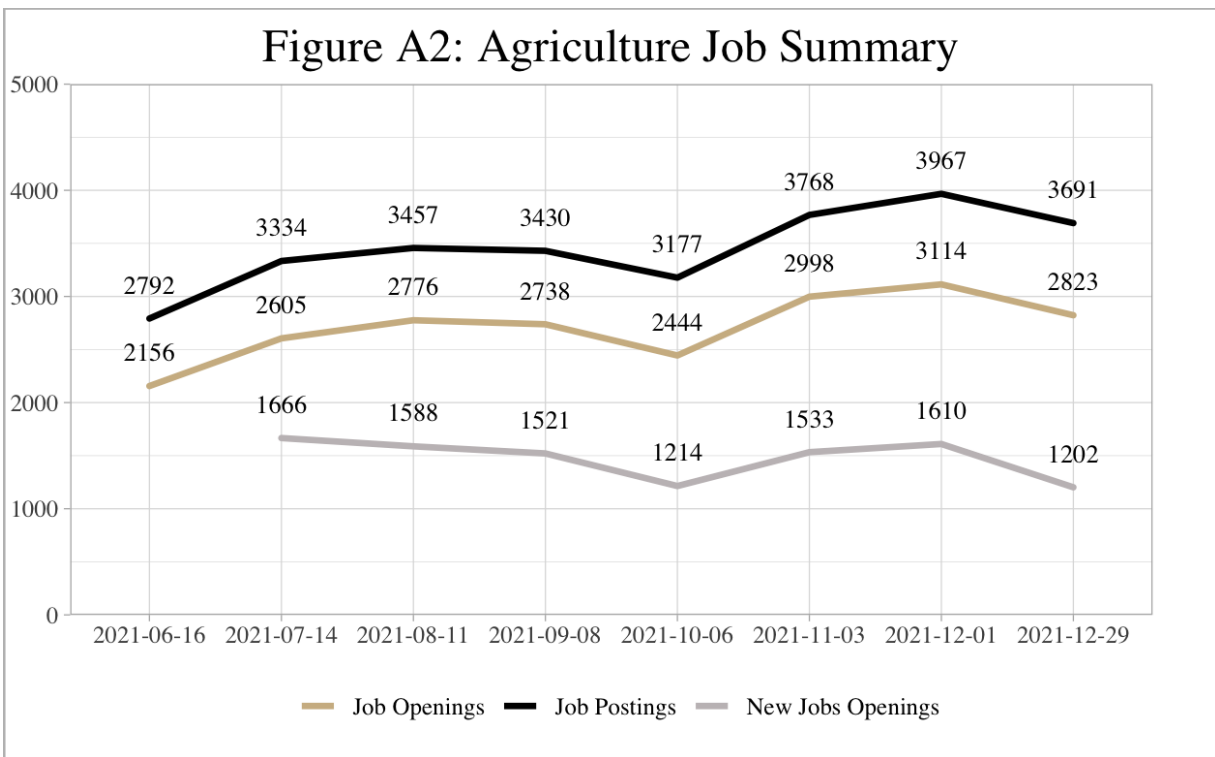
Figure A1: Job Postings per U.S. Region



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Job Trends

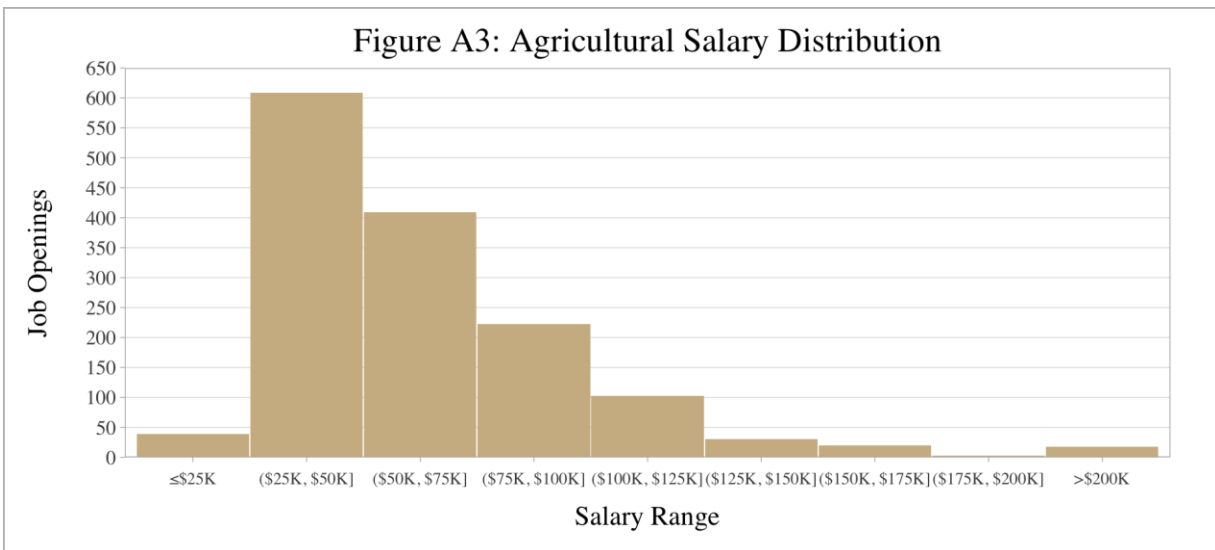
Figure A2 represents job trends for each month since data collection began in June 2021. Notice that new job openings are omitted for June 2021 as this is the first collection period. From the data collected, an average of around 1,476 new job openings are posted each month. Due to the duration of the data, it is not possible to determine the volatility in new jobs posted. The total number of agricultural job postings has generally increased over the data collection period, while the amount of new job openings has remained relatively flat. This could signal that employers are having a harder time filling existing jobs that have been posted for an extended amount of time.



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Salary

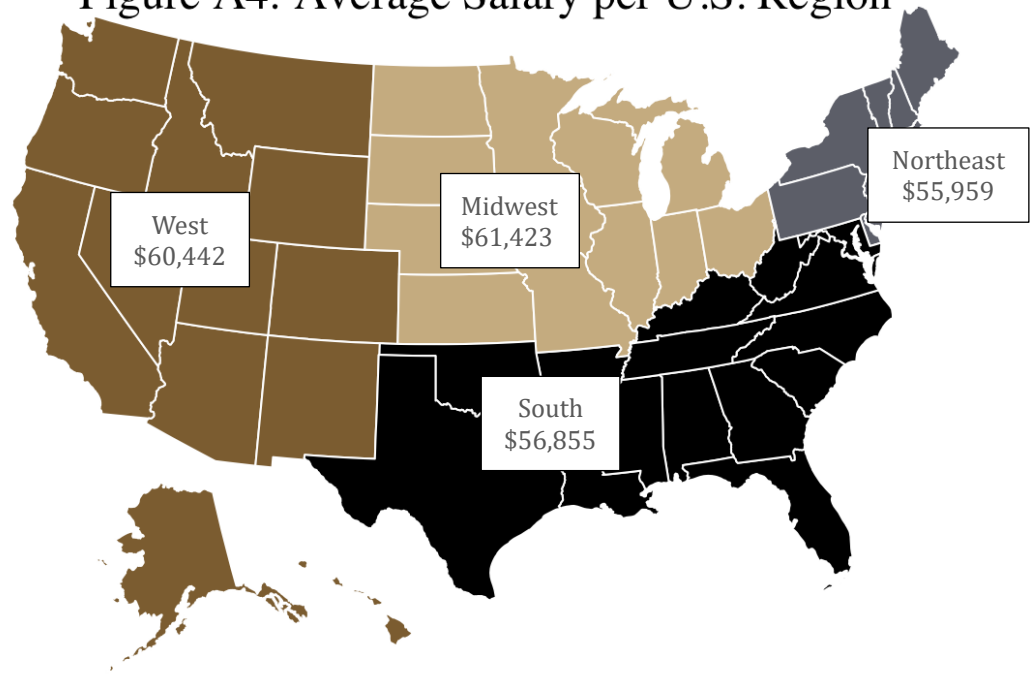
The national median annual salary computed from the agricultural jobs data was \$53,433 and the average annual salary was \$58,854. According to ZipRecruiter, the national average salary for agricultural related jobs is \$56,183 per year, confirming the data collected here is consistent with other sources. However, salary can vary significantly across subsectors of the agriculture industry and job level. Only 11.6% of agricultural jobs share salary information in their job postings. Figure A3 illustrates the distribution of salaries reported by agricultural job openings.



For the first quarter of 2021, The U.S. Bureau of Labor Statistics reported a median weekly income of \$1,001 for all industries. This weekly income annualizes to an estimated yearly salary of \$52,052 per year. Our agricultural jobs data report a median annual salary of \$53,433. Most salaries available within job postings are presented as pay ranges. For the purposes of this report, job salary ranges were averaged to create a single salary listed for each job opening. Because the salary data reported here is only collected for jobs that advertise salary, it may not be representative of the agriculture industry as a whole.

Average salaries vary by region. Figure A4 illustrates the variation in average salary throughout the U.S. The Midwest has the highest average annual salary listed in job postings at \$61,423 followed by the West at \$60,442, and the South at \$56,855. Agricultural jobs postings in the Northeast have the lowest average salary at \$55,959.

Figure A4: Average Salary per U.S. Region



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Description Analysis

KEYWORDS

The data can be grouped by keywords mentioned within job descriptions. Table 1 reports the percent of job openings that include each word, or some variation of it. The top 5 keywords are farming, natural resources, sales, agronomy, and economics. Jobs types that fit this description include seed and equipment sales positions, both of which require knowledge in the top 5 keywords to recommend and market products to farmers and consumers.

Table 1 Keywords	Average % of Job Openings that Mention
Academics	9.4%
Economics	28.3%
Ag Education	6.6%
Engineering	15.1%
Sales	52.7%
Agronomy	47.1%
Animal Science	24.9%
Farming	65.6%
Food Science	20.0%
Natural Resources	56.6%

REQUIRED SKILLS

Table 2 shows the average percentage of mentions for specific job requirements. Most agricultural jobs require experience, leadership, communication, education, teamwork, and travel, with experience being the most sought after quality. As Table 1 shows, agricultural jobs require knowledge and experience in multiple disciplines. Communication is an important agricultural job characteristics, referenced in the descriptions for 69.7% of job openings. We can infer that communication is a core competency for completing day-to-day work in agriculture. Overtime, this table could illustrate changes in skills requirements within agriculture. Though data related skills are only required for 30% of current job openings, demand for these skills by employers may grow as agriculture innovates.

Table 2 Requirements	Average % of Job Openings that Mention
Communication	69.7%
Critical Thinking	21.0%
Data	30.2%
Education	67.9%
Experience	85.5%
Leadership	75.9%
Microsoft	39.3%
Public Speaking	33.6%
Programming	9.9%
Quantitative	33.7%
Remote Work	11.1%
Teamwork	52.3%
Travel	50.5%

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DESIRED EDUCATION

Table 3 reports the percent of jobs 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 educational attainment. According to Table 3, a bachelor's degree, the most commonly cited degree requirement, is only mentioned in 16% of agricultural job postings.

Desired Education	Average % of Job Openings that Mention
High School	13.7%
Associates	2.3%
Bachelors	16.3%
Masters	10.6%
PhD	10.3%

JOB BENEFITS

The data for key terms related to job benefits are in Table 4 . These include the broad term of benefits, diversity, equal opportunity, tuition reimbursement, and 401(K). Companies may not report all the relevant benefits in an online job description. 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 reference specific benefits such as 401(K) and tuition reimbursement.

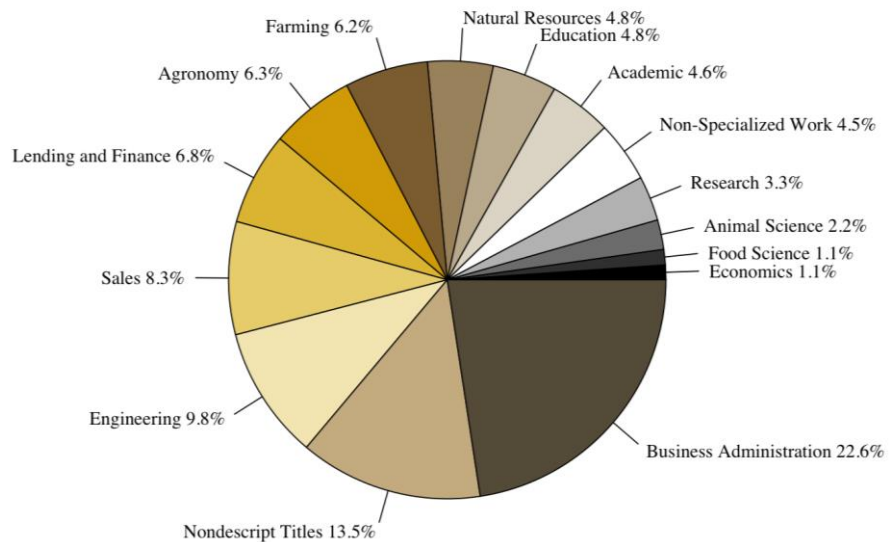
Benefits	Average % of Job Openings that Mention
Benefits	64.5%
Diversity	31.9%
Equal Opportunity	84.5%
Tuition Reimbursement	5.2%
401(K)	9.7%

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JOB CATEGORIES

Just like job descriptions, job titles showcase important information about jobs. Job categories can be classified based on terms written in job posting titles. The pie chart in Figure A5 shows the breakdown of agricultural job categories from June 2021 to December 2021. The most common job types are business administration (23%), engineering (10%), and sales (8%). Job titles that could not be classified make up nearly 14% of job postings.

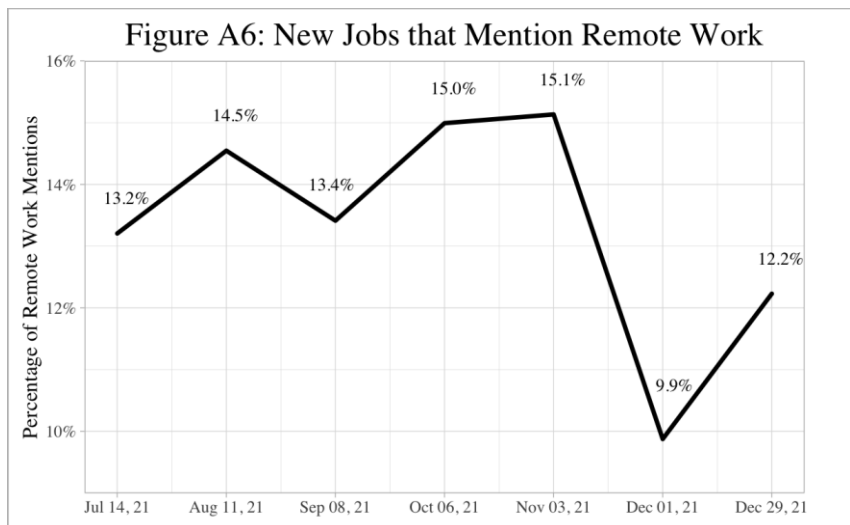
Figure A5: Job Categories by Keywords in Title



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. It is worth knowing how common remote work is in agriculture and the trend in agricultural remote work over time. This data only includes jobs openings in 2021, but as time continues, we can determine if there is a growing trend in remote work within agriculture. New agricultural job openings mentioning remote work fell markedly to under 10% in early December 2021 from an average of 14.2% of new openings between June 2021 and November 2021.

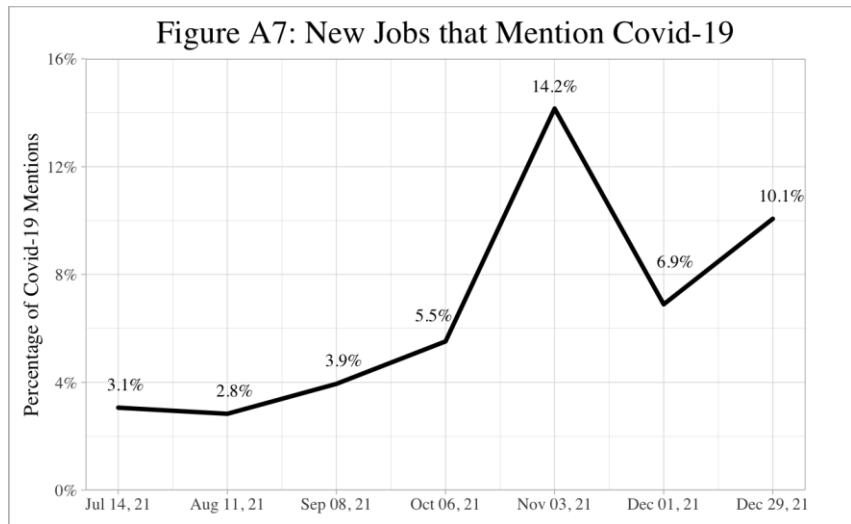
Figure A6: New Jobs that Mention Remote Work



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MENTION COVID-19

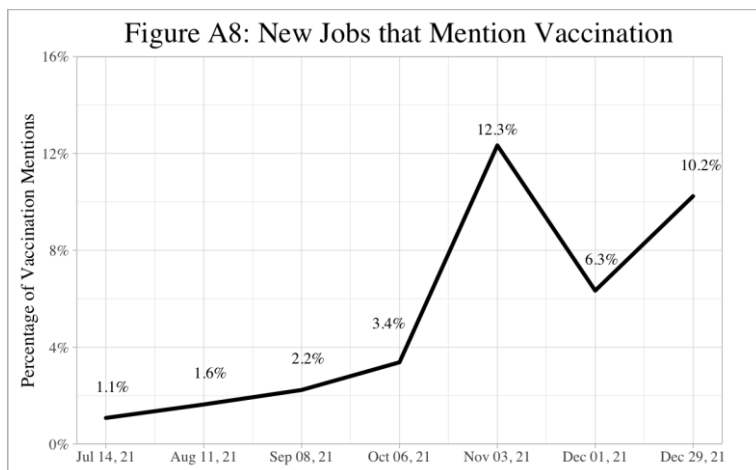
To further understand the effects of Covid-19 on the agricultural job market, we examined the data for mentions of the virus. Over time, new job postings are increasingly mentioning Covid-19, with a noticeable spike in mentions during November 2021.



MENTION VACCINATION

We also track mentions of Covid-19 vaccines within new job openings each month. This data follows a nearly identical trend to mentions of Covid-19 in new jobs. The table illustrates the percentage of vaccine mentions in job postings by each job category. The top 3 categories that mention vaccination are Animal Science (14%), Natural Resources (13%), and Economics (11%).

Job Category by Title	Job Openings that Mention Vaccines
Academic	3.7%
Agronomy	4.7%
Animal Science	14.0%
Business Administration	7.5%
Economics	11.3%
Education	6.2%
Engineering	1.4%
Farming	4.6%
Food Science	7.3%
Lending and Finance	1.9%
Natural Resources	13.1%
Nondescript Titles	4.4%
Research	3.9%
Sales	2.1%
Non-Specialized Work	2.4%

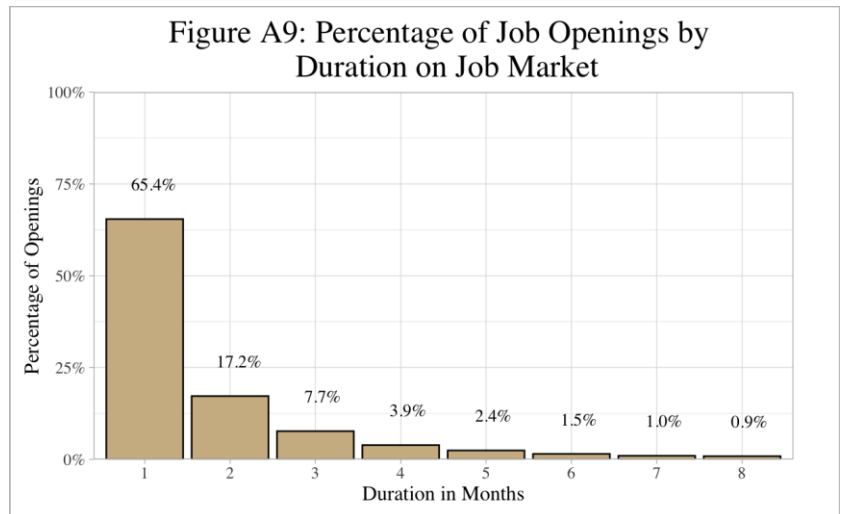


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DURATION ON JOB MARKET

The amount of time that a job opening is listed can be an indicator of how fast a job is able to fill or how long an employer searches for potential candidates.

Throughout this study, 65.4% of agricultural jobs are removed from the job market within one month while over 17.4% of job openings have been posted for 3 months or longer.



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 December 2021. 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 posting before

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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. It was calculated that 1,091 individual job boards are consolidated into the data present in this report. LinkedIn's job postings make up 22.7% data, making it the most popular job board for hosting agricultural jobs in the 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 1)	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 2)	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"

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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"
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 3)	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 4)	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"

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	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)"

Category (Related to Figure A5)	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",

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	"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"
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", "manufactur", "packag", "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"

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States in Each Region from Figure A1 and A4

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
West	AZ, CO, ID, NM, MT, UT, NV, WY, AK, CA, HI, OR, WA

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“Median Weekly Earnings Were \$916 for Women in Third Quarter 2021, 83.3 Percent of Men's Earnings.” *U.S. Bureau of Labor Statistics*, U.S. Bureau of Labor Statistics, 25 Oct. 2021, <http://www.bls.gov/opub/ted/2021/median-weekly-earnings-were-916-for-women-in-third-quarter-2021-83-3-percent-of-mens-earnings.htm>.