AGRICULTURAL JOB MARKET REPORT
October 2022 Report
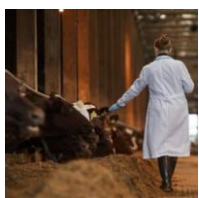
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Executive Summary

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 data extends from June 2021 to October 2022. 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

On average there are around 1,134 new agricultural job openings posted each month and October 2022 experienced 1065 new job openings on Google. Job postings, job openings, and new jobs decreased from May 2022 – September 2022. This month's report shows a sharp increase in job postings, opening, and new jobs.

SALARY

The average agricultural job salary is $56,529, which is below the average salary for all jobs in the United States. Jobs in sales, academics, and business administration are among the highest paid average salaries in agriculture. Remote jobs have the highest average salary followed by the Midwest.
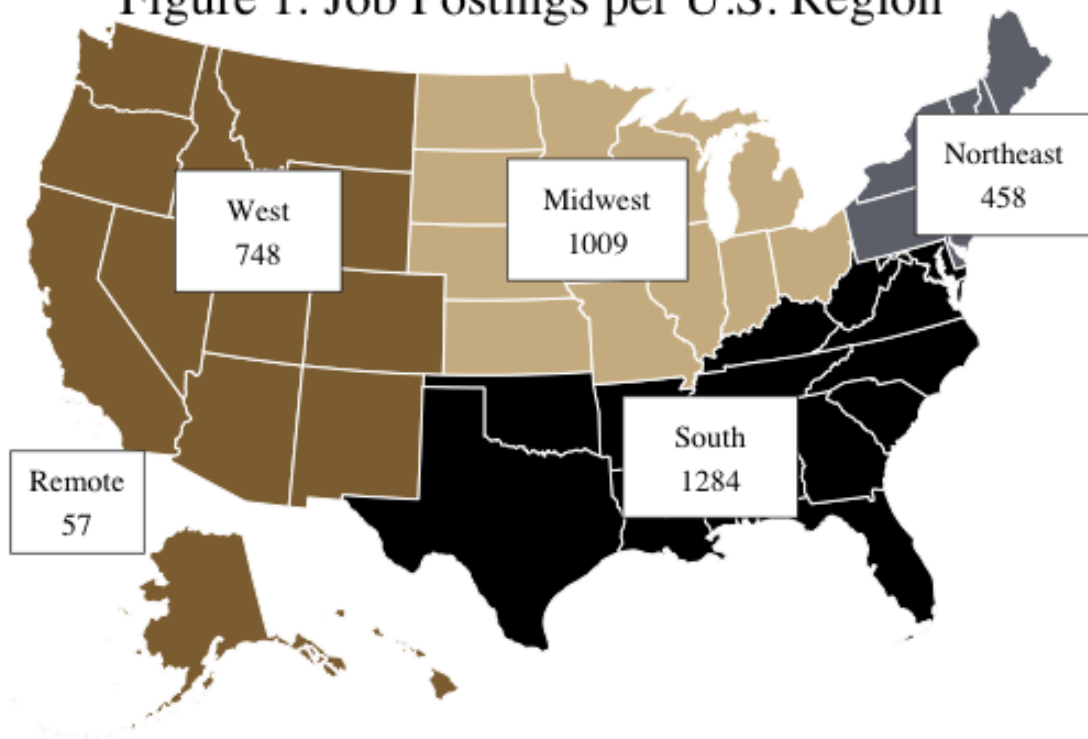
DESCRIPTION ANALYSIS

Agricultural jobs require a fair amount of experience. It is calculated that 85% of agricultural job postings mention experience in some form. In terms of job openings, the top 5 agricultural subsectors are business administration, engineering, sales, education, and lending and finance. 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 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 openings for each region of the United States. As of October 5th, 2022, there were 3,556 agricultural job postings.
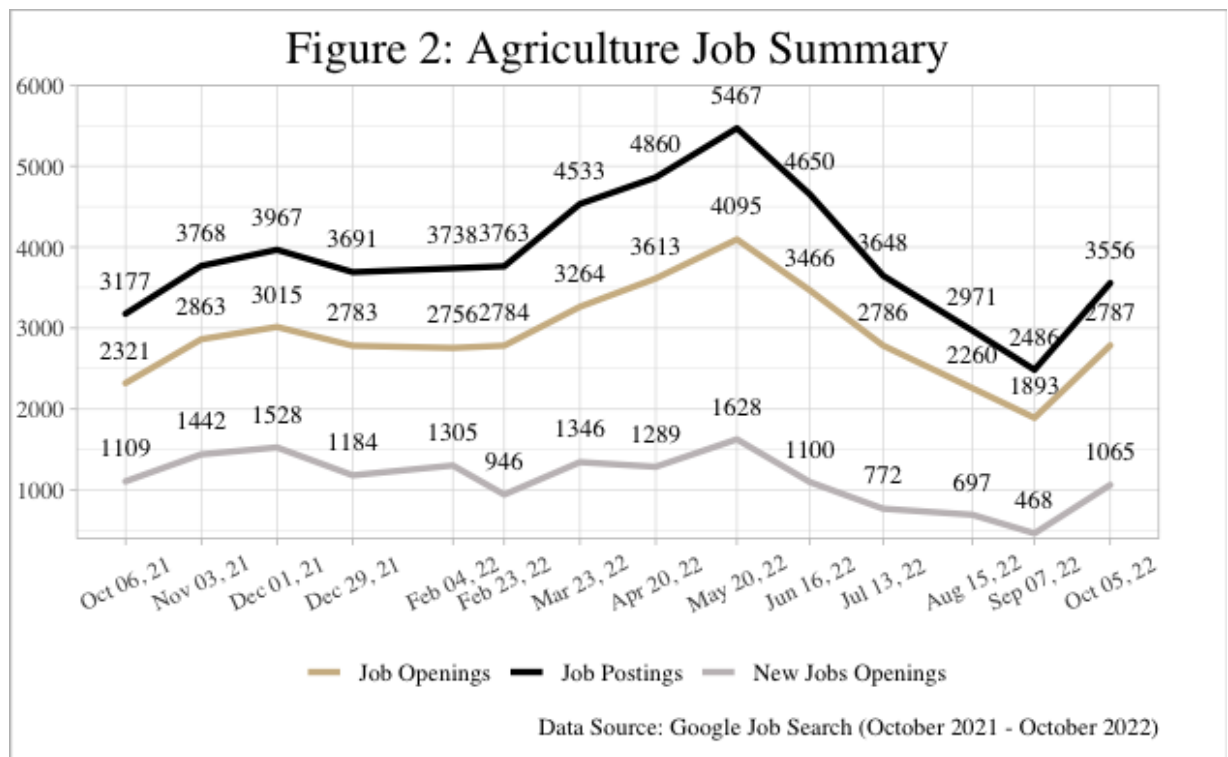

Figure 1: Job Postings per U.S. Region

West 748

Midwest 1009

Northeast 458

South 1284

Remote 57

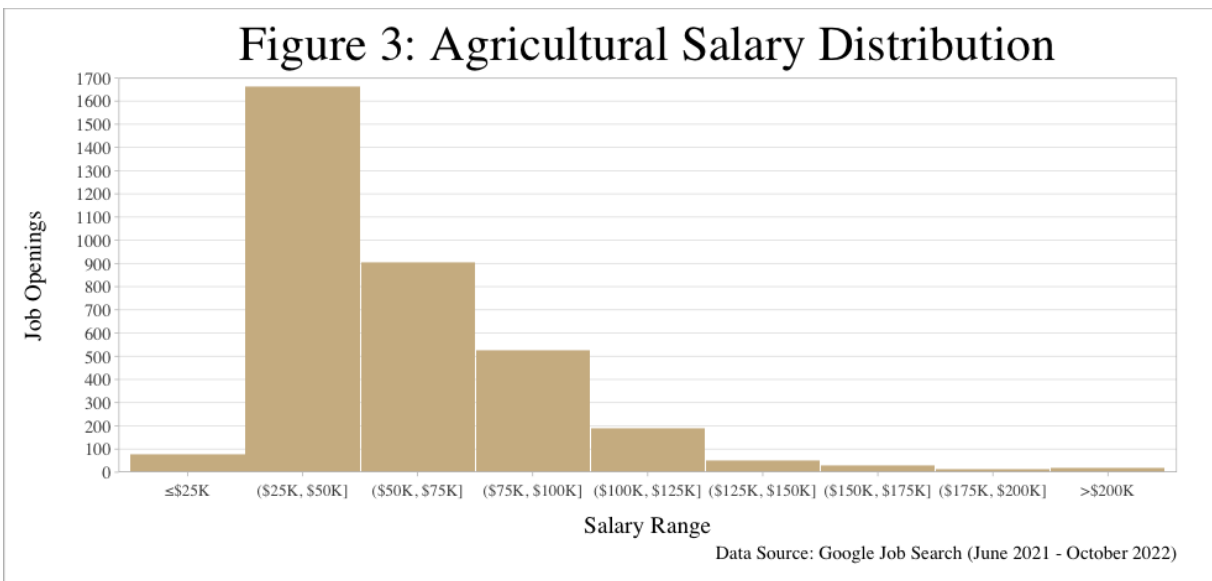Data Source: Google Job Search (October 2022)

Job Trends

Figure 2 represents one years' worth of job trends for each month from October 2021 to October 2022. On average around 1,134 new job openings are posted each month. The total number of agricultural job postings has generally increased over the data collection period up until May 2022. From May 2022 to September 2022, we experienced month over month decreases in job openings, job postings, and new job openings on Google's job search page. However, in the last month, October has experienced an increase in job postings, openings, and new jobs. This increase in job demand likely coincides with increased job opportunities as employers are recruiting at career fairs hosted among college campuses during the fall.

Figure 2: Agriculture Job Summary

Data Source: Google Job Search (October 2021 - October 2022)

Salary

The national median salary computed from the data was $50,000/year and the average salary was $56,529/year. Figure 3 illustrates the distribution of salary among agricultural job postings. According to ZipRecruiter, the national average salary for agricultural related jobs is $53,900/year and the average salary for all occupations is $67,582/year.

Figure 3: Agricultural Salary Distribution

Data Source: Google Job Search (June 2021 - October 2022)

SALARY BY CATEGORY

The job openings in this data are not equally distributed across all subsectors of agriculture and salary varies among subsectors. Jobs in sales ($78,663/year), academics ($71,462/year), and business administration ($67,519/year) have the highest paid average salaries. Jobs in farming rank last with an average salary of $42,052/year.

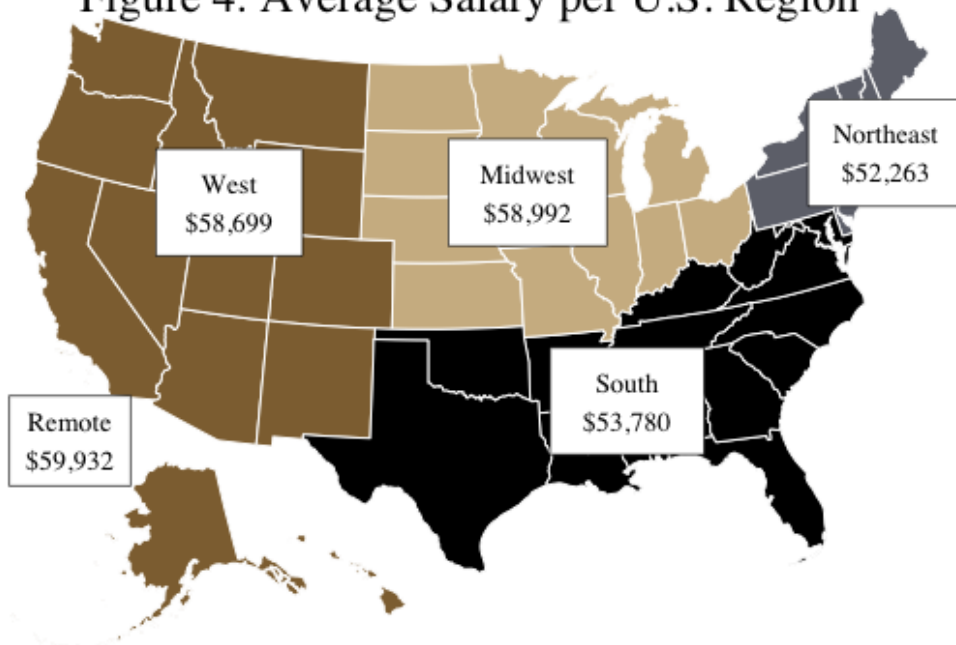| Table 1 Job Category by Title	Average Salary	Median Salary
Academic	$71,462	$67,315
Agronomy	$64,337	$54,727
Animal Science	$57,676	$46,171
Business Administration	$67,519	$55,000
Economics	$59,282	$51,495
Education	$54,611	$50,990
Engineering	$66,859	$59,907
Farming	$42,056	$36,400
Food Science	$60,652	$48,298
Lending and Finance	$67,492	$64,009
Natural Resources	$55,387	$44,740
Nondescript Titles	$55,817	$49,920
Research	$53,008	$45,000
Sales	$78,663	$65,000
Non-Specialized Work	$46,364	$39,793
Google Job Search (June 2021- October 2022)		

SALARY BY REGION

Average salaries vary by region. Figure 4 illustrates the vartiation in average salaries across the U.S. Fully remote jobs have the highest listed salary at $59,932/year. The Midwest has the 2nd highest average salary listed in job postings at $58,992/year followed by the West at $58,699/year. The fourth highest average salary by region is the South at $53,780/year, followed by the Northeast at $52,263/year.

Figure 4: Average Salary per U.S. Region

West
$58,699

Midwest
$58,992

Northeast
$52,263

Remote
$59,932

South
$53,780

Data Source: Google Job Search (June 2021 - October 2022)

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, sales, agronomy, and economics. Job types that fit this description include seed and equipment sales positions, both of which require knowledge of the top 5 keywords to recommend and market products to farmers and consumers.

Table 2 Keywords	Job Openings that Mention
Academic	7.7%
Economics	27.9%
Ag Education	6.8%
Engineering	18.4%
Sales	52.8%
Agronomy	48.3%
Animal Science	20.6%
Farming	64.4%
Food Science	21.2%
Natural Resources	55.7%
Google Job Search (October 2022)	

REQUIRED SKILLS

Table 3 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 2 shows, agricultural jobs require knowledge and experience in multiple disciplines. Communication is an important agricultural job characteristic, referenced in the descriptions of 73% 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 the agricultural sector. Though data related skills are only required for 31% of current job openings, demand for these skills by employers may grow as agriculture continues to innovate.

Table 3 Requirements	Job Openings that Mention
Communication	72.7%
Critical Thinking	21.4%
Data	31.0%
Education	62.2%
Experience	85.4%
Leadership	73.7%
Microsoft	42.5%
Public Speaking	34.7%
Programming	10.4%
Quantitative	33.8%
Remote Work	13.0%
Teamwork	52.7%
Travel	59.1%
Google Job Search (October 2022)	

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 educational attainment. According to Table 4, a high school degree, the most cited degree requirement, is only mentioned in 16% of agricultural job postings.

Table 4 Desired Education	Job Openings that Mention
High School	16.1%
Associates	2.0%
Bachelors	14.4%
Masters	9.1%
PhD	7.2%
Google Job Search (October 2022)	

JOB BENEFITS

The data for 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). 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

Table 5 Benefits	Job Openings that Mention
Benefits	66.3%
Diversity	30.0%
Equal Opportunity	85.2%
Tuition Reimbursement	5.9%
401(K)	12.4%
Google Job Search (October 2022)	

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.
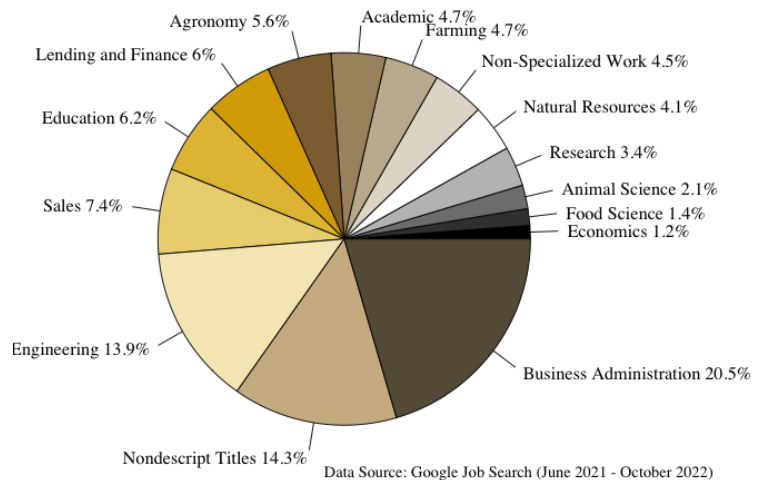
JOB CATEGORIES

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 June 2021 to October 2022. The most common job types are business administration (21%), engineering (14%), and sales (7%). Job titles that could not be classified make up nearly 14% of agricultural job postings.
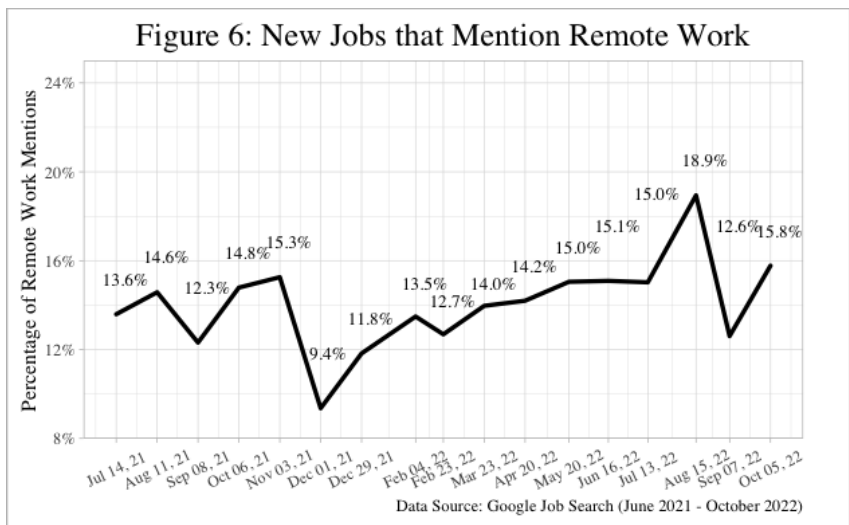
Figure 5: Job Categories by Keywords in Title

Data Source: Google Job Search (June 2021 - October 2022)

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. Mentions of remote work have generally increased over time.
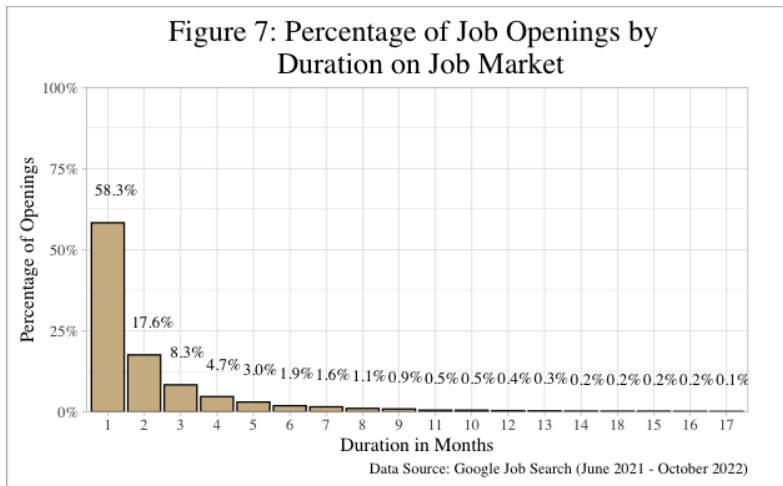

Figure 6: New Jobs that Mention Remote Work

Data Source: Google Job Search (June 2021 - October 2022)
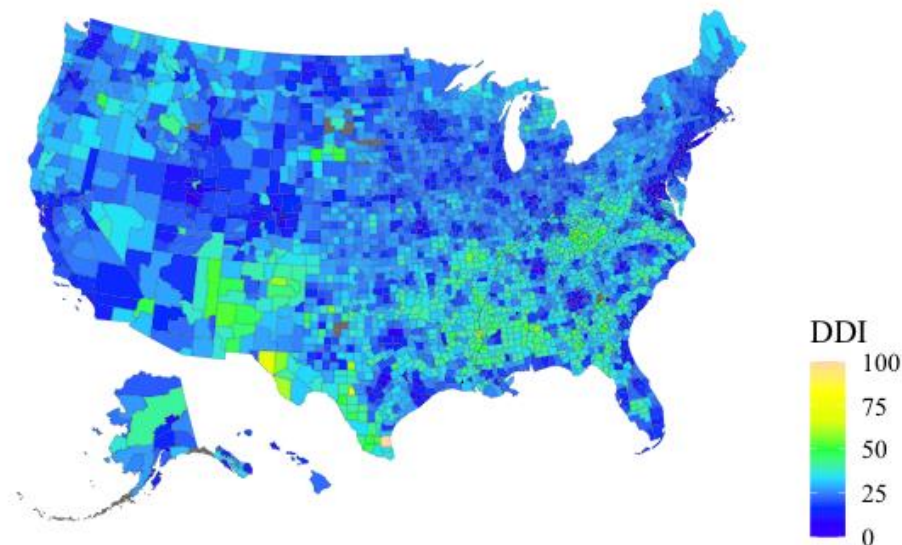
DURATION ON JOB MARKET

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. Throughout this study, 58% of agricultural jobs are removed from job posting sites within one month while over 24% of job opening have been posted for 3 months or longer.

Figure 7: Percentage of Job Openings by Duration on Job Market

Data Source: Google Job Search (June 2021 - October 2022)

THE DIGITAL DIVIDE INDEX

In our report from April 2022, we compared agricultural jobs across metro and non-metro counties in the United States. For this month, we decide to analyze agriculture jobs by their county's digital divide index. The digital divide index (DDI) is a metric that measures the digital divide within a county. The DDI ranges from 0 to 100 with 100 signifying the highest value of digital division. Figure 8 illustrates the DDI within U.S. counties in 2021.
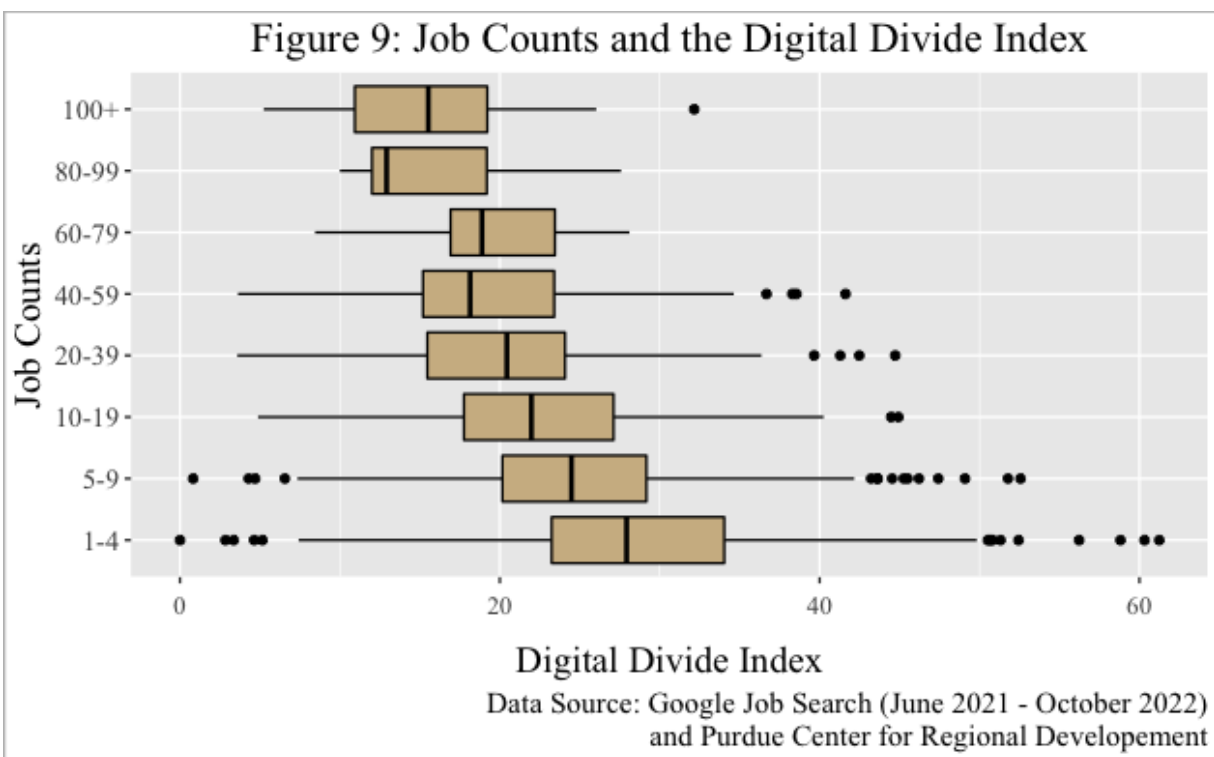

Figure 8: Digital Divide Index in U.S. Counties

Source: Purdue Center of Regional Development

We were interested in the relationship between broadband and agricultural jobs. Without controlling for any other factors, we found that there is a negative association between agriculture jobs and the digital divide index meaning that as the digital divide index increases agricultural job counts decrease. The correlation between job counts and the digital divide index is -0.26. Figure 9 illustrates that as the average digital divide index increases, we experience a decrease in agricultural job counts within counties. However, it is important to note that we are not including all factors that may impact the level of agriculture jobs in a county and these may include information on demographics, economic factors, and levels of agricultural production.

Figure 9: Job Counts and the Digital Divide Index

Data Source: Google Job Search (June 2021 - October 2022) and Purdue Center for Regional Developement

The collection of agricultural job advertisements has coincided with graduate research in Purdue's Agricultural Economics Department. Douglas Abney, a master's student at Purdue, is currently studying the relationship between broadband and the level of agricultural jobs within U.S counties. Throughout his research he has gained access to broadband metrics collected by Purdue's Center for Region Development to compare with agricultural job advertisements. With his research, will determine if there is an association between broadband and the growth of digital agriculture jobs.

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 October 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 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.

AGRICULTURE JOB MARKET REPORT

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"
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)"

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"
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"

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

References

"About Indeed." *Indeed.com*, Mar. 2020, www.indeed.com/about.

"Agricultural Salary ($53,900 - August 2022) ZipRecruiter." *ZipRecruiter*, 18 Aug. 2022, https://www.ziprecruiter.com/Salaries/Agricultural-Salary.

"Search Salary ($67,582 - August 2022) ZipRecruiter." *ZipRecruiter*, 18 Aug. 2022, https://www.ziprecruiter.com/Salaries/Search-Salary.

SerpApi, LLC. "Google Jobs API." *SerpApi*, 2022, https://serpapi.com/google-jobs-api.

Gallardo, Roberto. "2020 Digital Divide Index (DDI)." *ArcGIS StoryMaps*, Esri, 20 Sept. 2022, http://pcrd.purdue.edu/ddi.