



**VETERINARY MEDICINE
EXTENSION**

Development of the OSU Integrated Beef Cattle Program for Veterinarians to Address Rural Veterinary Practice Sustainability

ROSSLYN S. BIGGS, DVM
DIRECTOR OF CONTINUING EDUCATION
BEEF CATTLE EXTENSION SPECIALIST



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Overview

1. The Why



2. The Program



3. The Participants



Veterinary Contributions to Rural Communities

Food Safety and Security



One Health



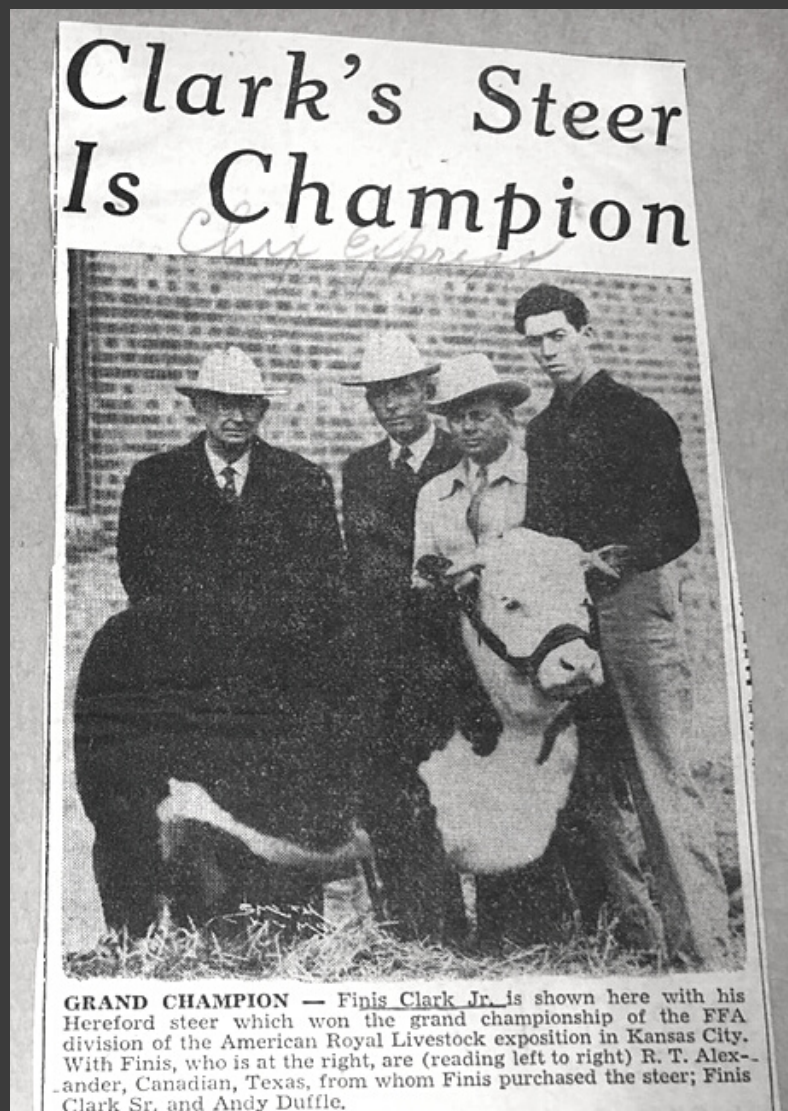
Rural Employers



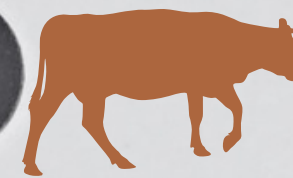


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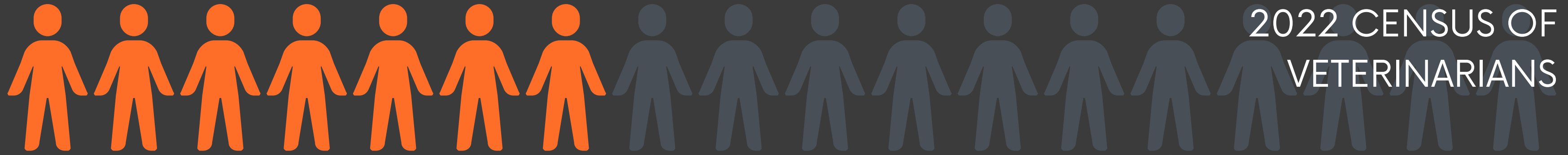
Why Rural Veterinary Medicine?



Rural Veterinary Shortage
= Complicated



2022 CENSUS OF
VETERINARIANS

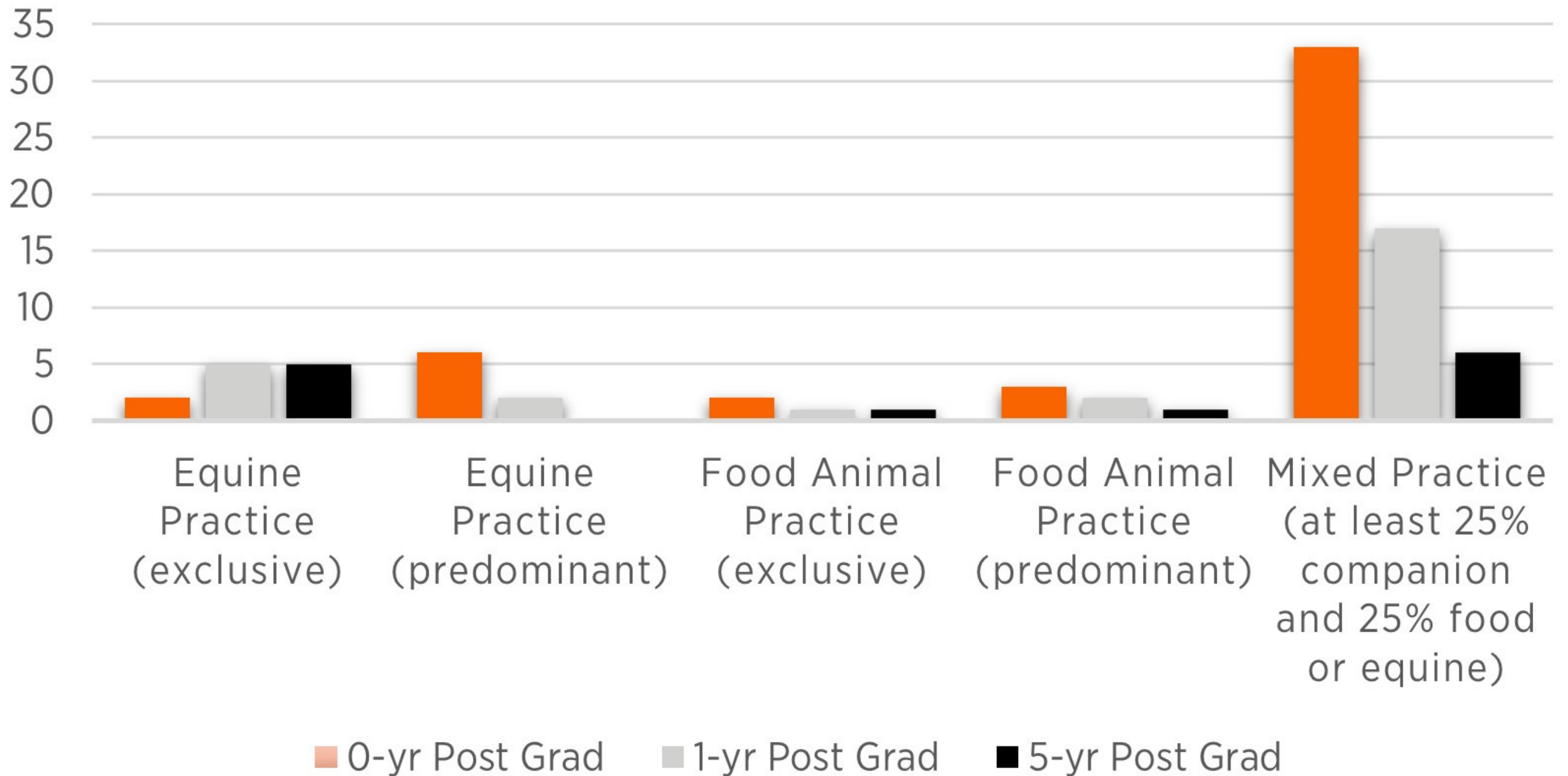


125,465 U.S. Veterinarians

1.8% are Food Animal Private Practice

4.9% are Mixed Animal Private Practice

Large Animal Employment Trends





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VETERINARY MEDICINE**



**United States
Department of
Agriculture**



Integrated Beef Cattle Program for Veterinarians



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Overall Objectives

Rural Practice
Sustainability



Expand Service



Recruit and Retain
Graduates



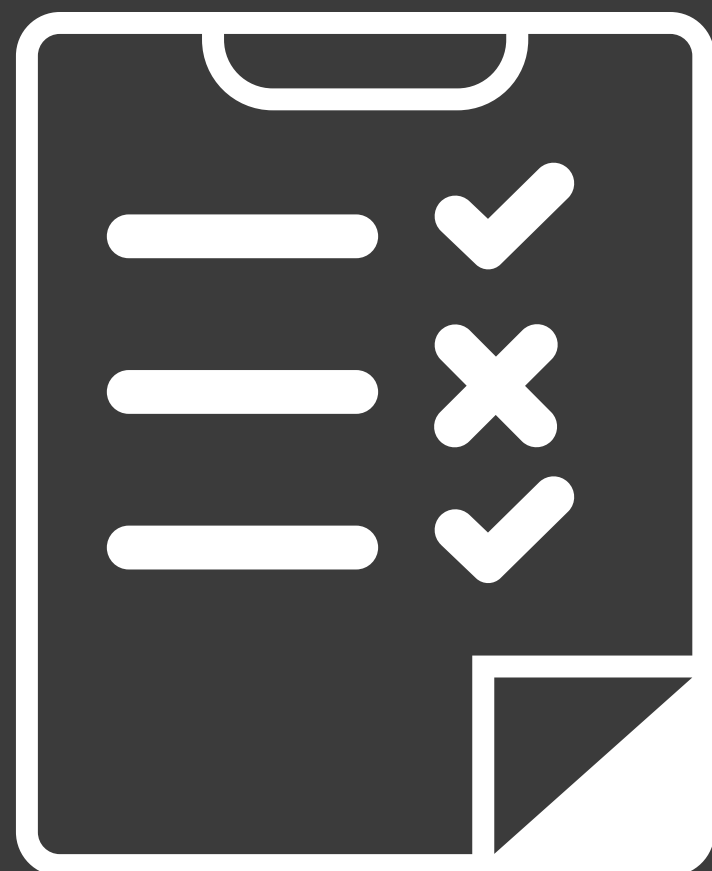


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INTEGRATED BEEF CATTLE PROGRAM FOR VETERINARIANS

Plan

Data Collection



Curriculum
Development and
Implementation



Network DVMs and
Students





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INTEGRATED BEEF CATTLE PROGRAM FOR VETERINARIANS

DVM Survey



- 162 DVM Responses
- 34% Response Rate
- 60% Owners
- 39% Mixed Animal
- 39% >30 Years in Practice
- 51% 1 Doctor Practice



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INTEGRATED BEEF CATTLE PROGRAM FOR VETERINARIANS

Biggest Challenge to Practice Sustainability

Hiring Associate
25%



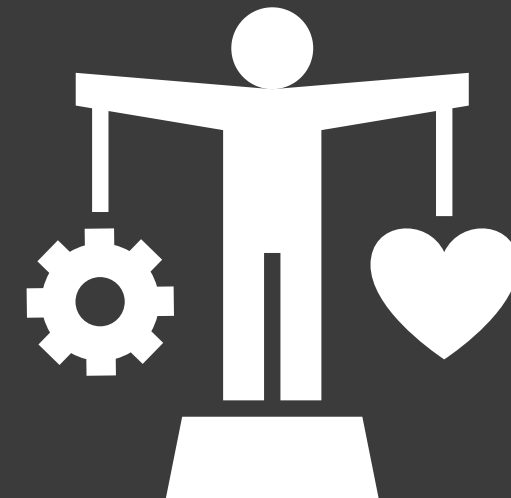
Finances
8.5%



Personal Health
10%



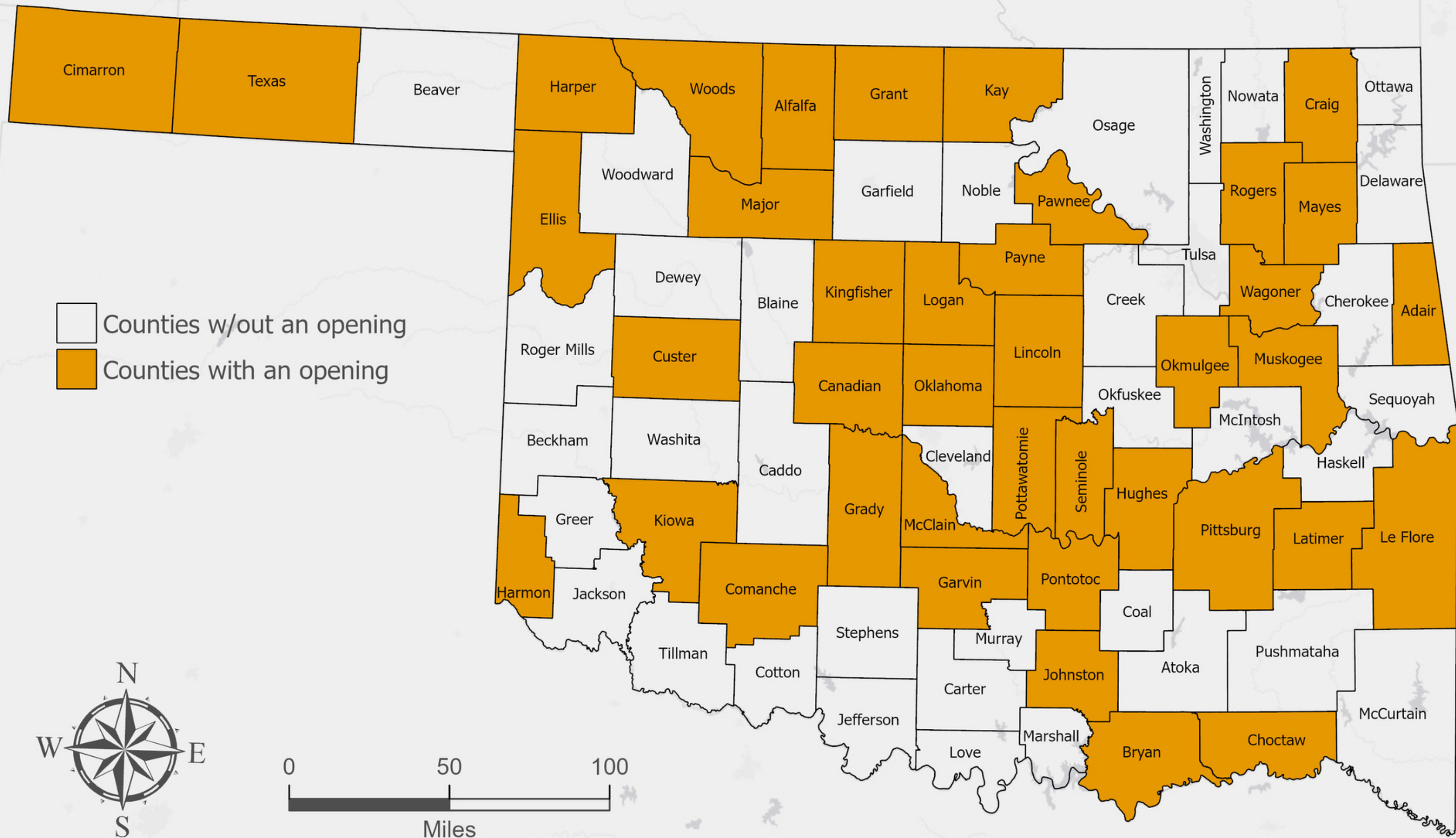
Poor Work-life
32%



Lack of Clients
6%



Counties with a Job Opening for a Veterinarian in Oklahoma (2020-2021)





Class I

Class II



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EDUCATION CENTER

DALTON NEWELL

DVM | SURGEON VETERINARY SERVICES





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The Future

- International interest
- DVMs with students
- Expanded curriculum
- Challenge remains
- Progress
- Support





VETERINARY MEDICINE EXTENSION



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**OKLAHOMA WATER
RESOURCES CENTER**

EXTENSION

DEPARTMENT OF
**BIOSYSTEMS AND
AGRICULTURAL ENGINEERING**

OKLAHOMA WELL OWNER NETWORK

Jeff Sadler, Kevin Wagner, Nicole Colston, Jim Pendred,
James Lee, Kaylin Hall, Brody Bouher, Erycka Pretorius

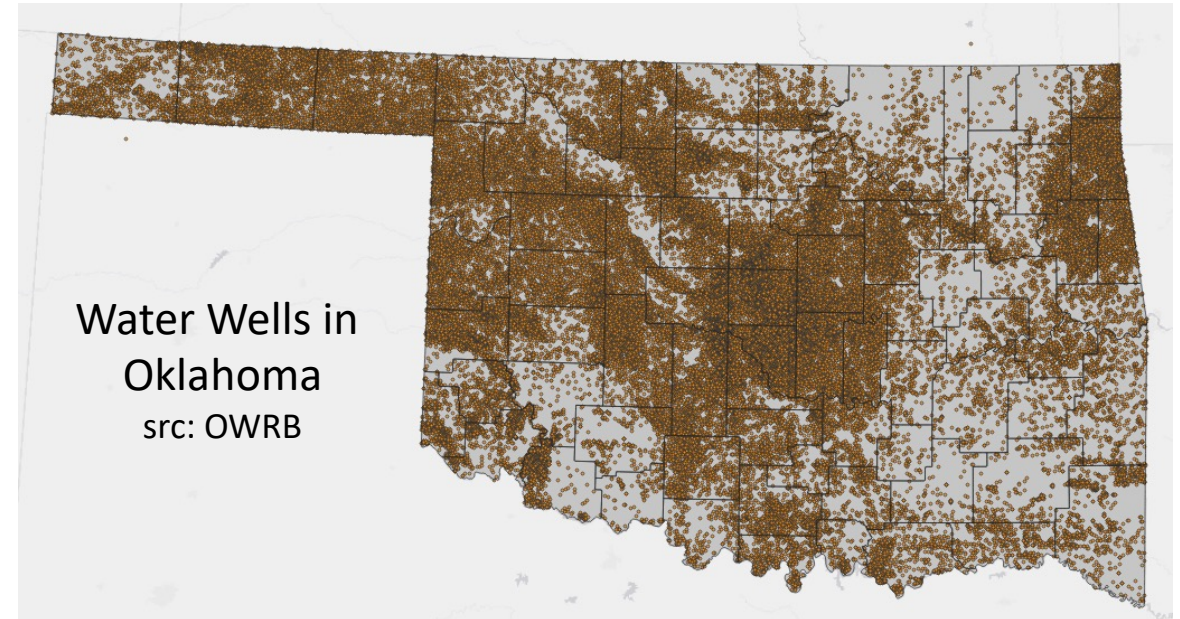
Assistant Professor and State Water Resources Extension Specialist
Dept. of Biosystems and Ag Engineering

In conjunction with **Oklahoma Water Resources Center**



WHY THIS PROGRAM?

- The Safe Drinking Water act protects the quality of ***public*** drinking water but there is no government program for monitoring or protecting ***private*** wells.
- Oklahoma has about 35,000 private wells that are used for domestic water consumption.



WHY THIS PROGRAM?

- People are concerned about their well water



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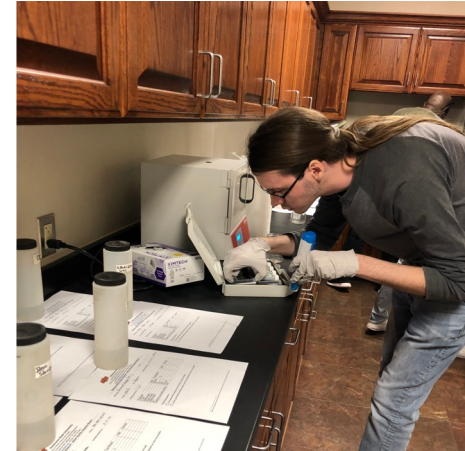
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WHAT ARE WE OFFERING?

Free well water screening and training events

- Well owners collect water samples and bring to County Extension office or other local venue.
- We test samples for specific contaminants that may affect human.
- We provide testing results, educational resources, and recommended actions to well owners to protect or improve water quality in their wells.



Images taken by Tommy Puffinbarger



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CONTAMINANTS THAT WE SCREEN FOR

1. Bacteria (E coli)
2. Nutrients (Nitrate)
3. Acidity & Alkalinity (pH)
4. Salt content (Conductivity and Total Dissolved Solids)
5. Hardness
6. Toxic chemicals (Arsenic)
7. Customized screening: we may test for contaminants that are not in our list but are problematic in your area



Image taken by Rayna Ellison



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HOW DOES THE PROGRAM WORK

We coordinate with a local organization

Our Role	Local Organization's role
<ul style="list-style-type: none">• Provide marketing materials• Come to the event to receive water samples• Provide education (via printed material or oral presentation)	<ul style="list-style-type: none">• Promote the event• Answer any questions leading up to the event• Set up the venue



WORKING WITH COUNTY EXTENSION

Set up a standalone educational event



Image taken by Tommy Puffinbarger



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WORKING WITH COUNTY EXTENSION

Join in an existing event

- County Fair
- Health Fair



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WORKING WITH LOCAL LIBRARIES

Partner with local libraries



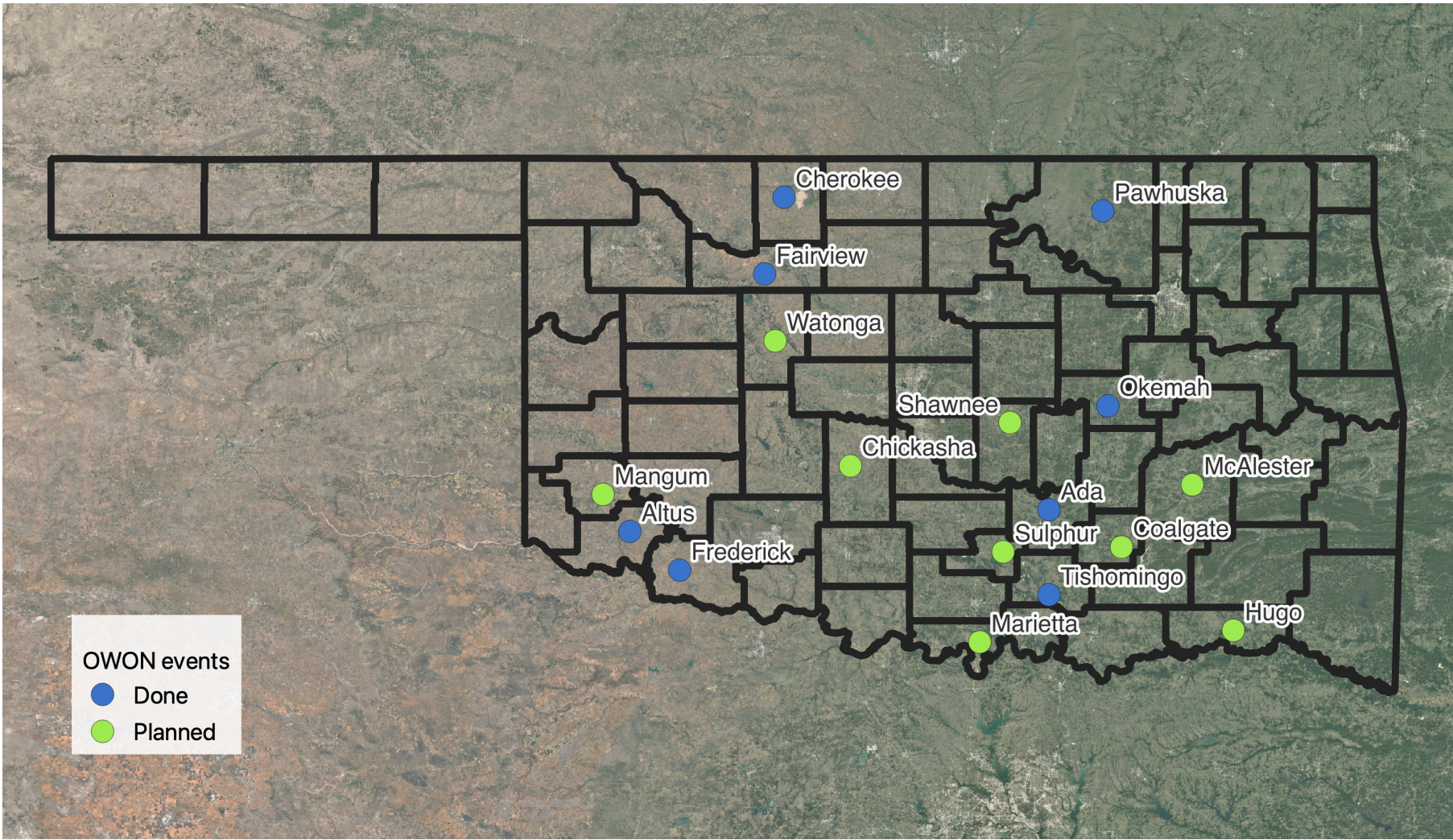
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WHERE HAVE WE DONE THIS?



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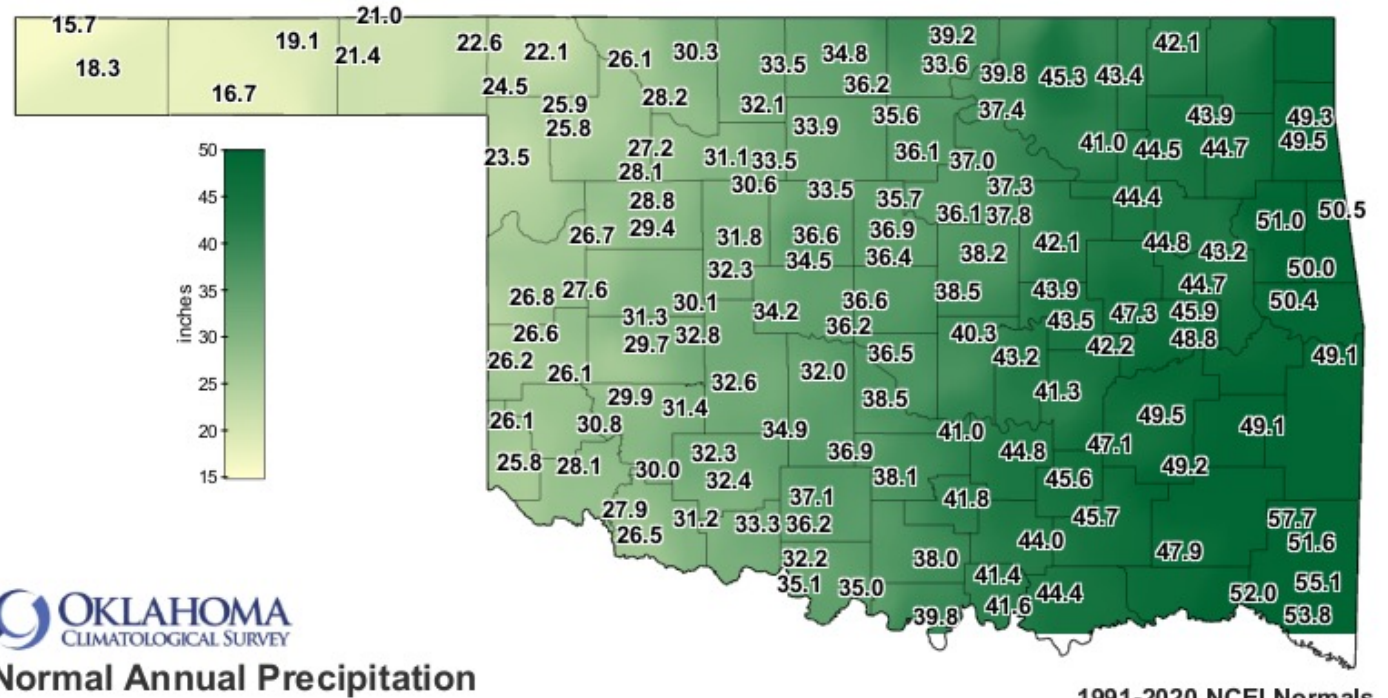


WHAT HAVE WE LEARNED?

Higher nitrates in west

Higher TDS (salts) in west

More interest in west



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WHAT HAVE WE LEARNED?

So far standalone events have had better turnouts



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WHAT HAVE WE LEARNED?

- Any publicity is good publicity

OKLAHOMA'S NEWS 4

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SEEN ON TV

Oklahoma Water Resources Center to offer free water well testing

by: Kaylee Douglas/KFOR
Posted: Oct 17, 2023 / 03:01 PM CDT
Updated: Oct 17, 2023 / 03:01 PM CDT

(Getty Images)

SHARE [Facebook] [Twitter] [LinkedIn] [Email]

OKLAHOMA CITY (KFOR) - The Oklahoma Well Owner Network (OWON) Program provides free residential well water testing and training to rural counties in Oklahoma.

TRENDING

- 1 Family mourns 20-year-old killed at Halloween party
- 2 ODOT: WB I-40 closed west of Ft. Smith junction



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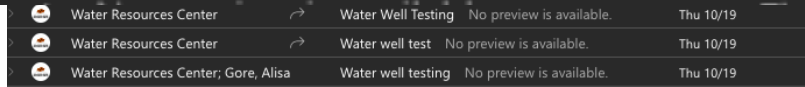
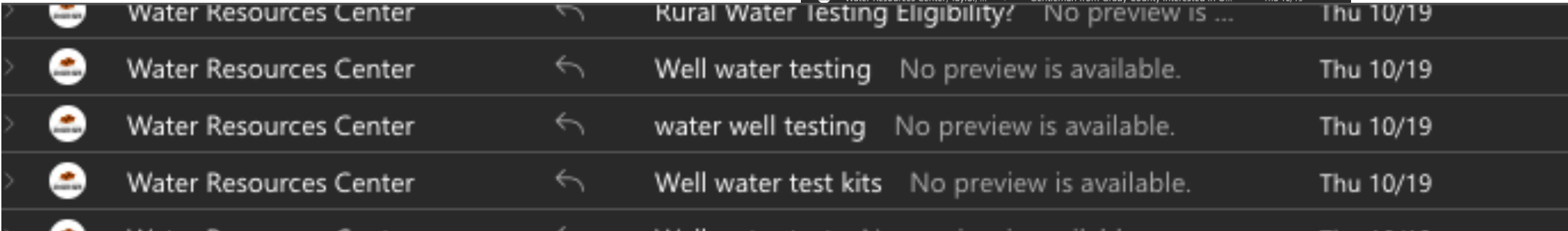
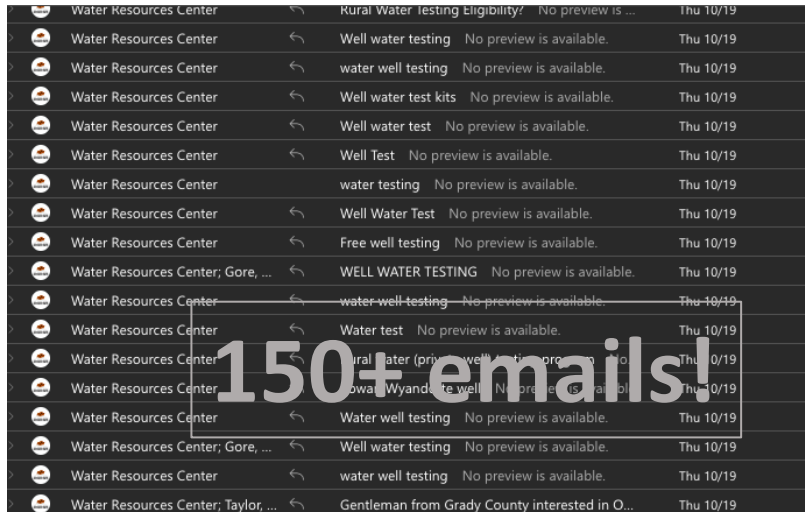
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WHAT HAVE WE LEARNED?

- People are interested



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OKLAHOMA WELL OWNER NETWORK

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Specialist

Dept. of Biosystems and Ag Engineering

In conjunction with **Oklahoma Water Resources Center**





Quantifying Drought Impacts on Oklahoma's Rural Communities

Katherine L. Welch, Dayton M. Lambert, Amy Hagerman, Erik Krueger,
Lixia H. Lambert, Tyson Ochsner, Paul Weckler

Oklahoma State University

Rural Renewal Symposium

November 2-3, 2023

Lone Wolf, OK

Acknowledgments: This research was supported with funding from the Sparks Chair in Agricultural Science and Natural Resources and Oklahoma State University Office Tier 1 Rural Renewal Initiative 1-151215: "A multi-dimensional approach for quantifying drought impacts on Oklahoma's rural communities, and implications for water management."



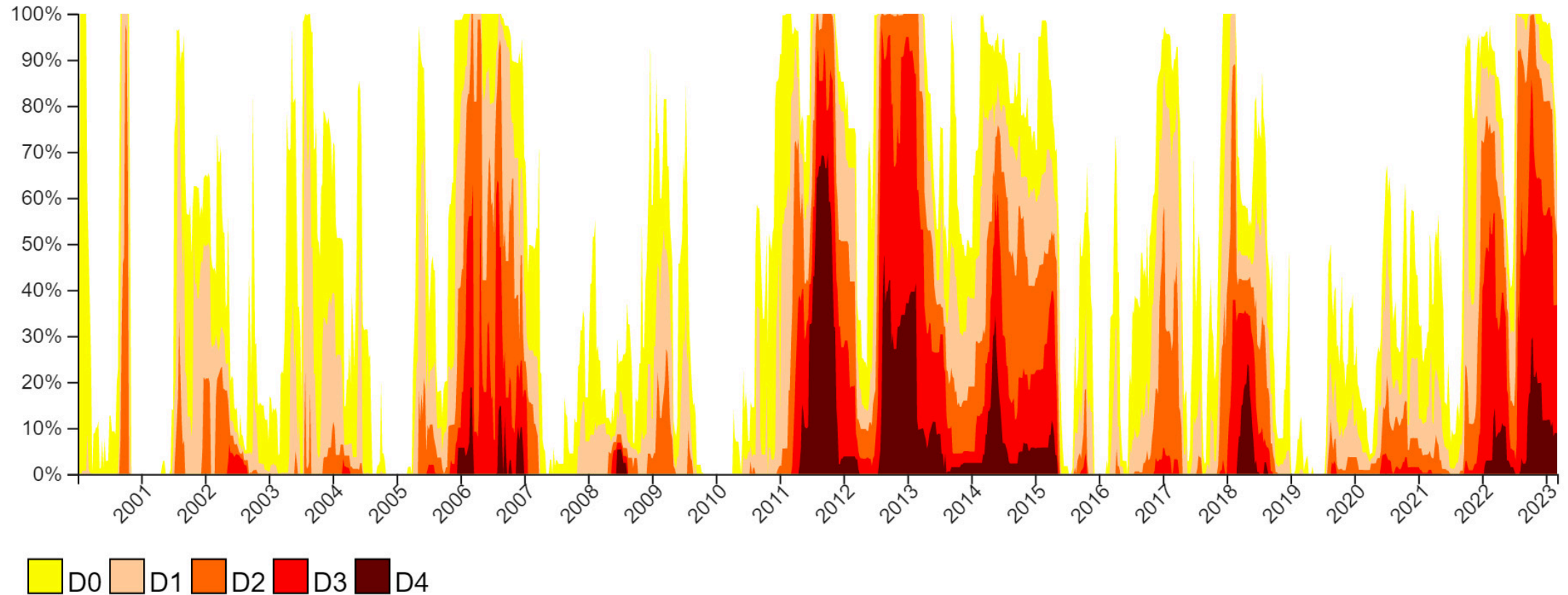
Problem and Objective

- What are the economic losses experienced by communities in Tillman, Jackson, and Harmon counties due to drought?
 - Crop and livestock sectors
- How does crop insurance mitigate the effects of drought-related loss?
- Provide information for drought mitigation decision-makers as they consider water use in their communities
 - Effects of insured vs. uninsured crops in drought scenarios
- Qualitative and Quantitative Analysis



Historical Drought Severity, Oklahoma






Latest Available Data: 2023-03-07



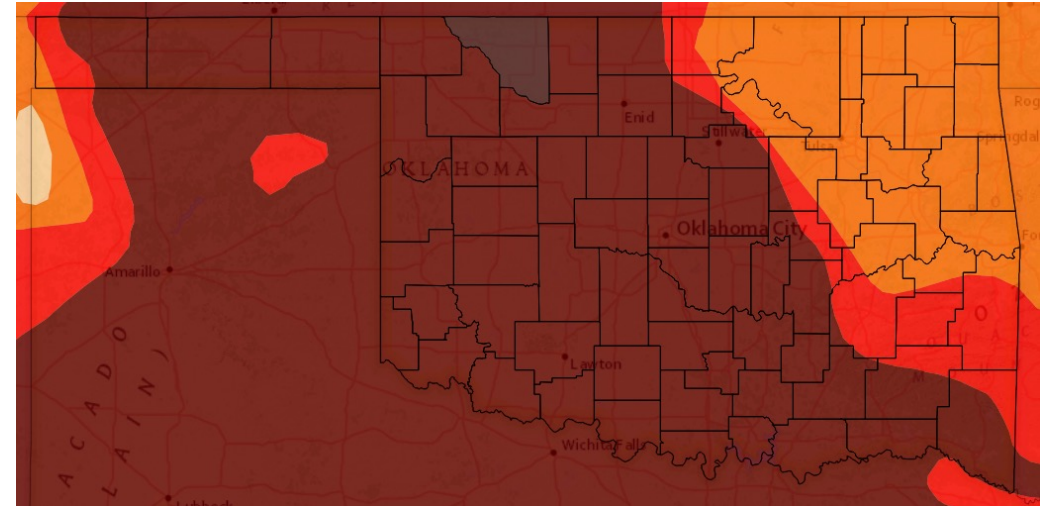
Source: Drought.gov, National Integrated Drought Information System



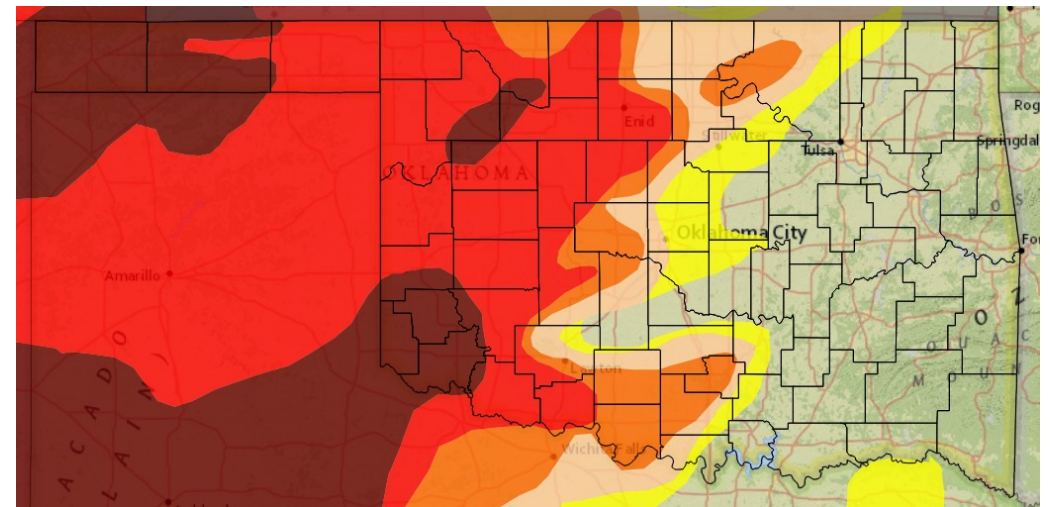
Drought, Oklahoma

	D0 - Abnormally Dry <ul style="list-style-type: none">Crops are stressed (wheat, canola, alfalfa, pecans); winter wheat germination is delayedStock pond levels decline	63.57% of OK (D0-D4)
	D1 - Moderate Drought <ul style="list-style-type: none">Summer crop and forage yields are reducedWildfire risk increasesLake recreation activities are affected; deer reproduction is poor	54.07% of OK (D1-D4)
	D2 - Severe Drought <ul style="list-style-type: none">Dryland crops are severely reduced; pasture growth is stuntedCattle are stressedBurn bans begin	49.87% of OK (D2-D4)
	D3 - Extreme Drought <ul style="list-style-type: none">Grasses are dormant, and hay is nonexistent; planting is delayed; fields are spotty; emergency CRP grazing is authorizedCattle have little water and feedWildfires are increasing in number and severity; air quality is poor, with dust storms and smoke	43.03% of OK (D3-D4)
	D4 - Exceptional Drought <ul style="list-style-type: none">Ground is cracking; farmers are bailing failed crops or abandoning fields; pastures are bare; land is abandonedCost of hay and water is high and supplies are scarce; producers are liquidating herdsBurn restrictions increase; fire season is long	20.62% of OK (D4)

2011



2022



Effects of Drought

- Economic loss, crop, livestock
- Water restrictions
- Brush fires
- Loss of recreation days, low lake levels





Effects of Drought – Qualitative Analysis

- Area Interviews
 - John Clemmons and Hoyt Nebgen – poster session
- Some Findings
 - Drought directly affects producers, but effects are felt through the supply chain
 - Farmers have access to insurance, but gins and co-ops do not
 - Irrigation adoption in response to drought – drip and no-till
 - Investment in water infrastructure needed



Input-Output Analysis

Export Base Theory

- The export sector of a region produces a good/service
- These goods are demanded elsewhere which generates income
- The non-export sector exists to supply goods and services to the export sector

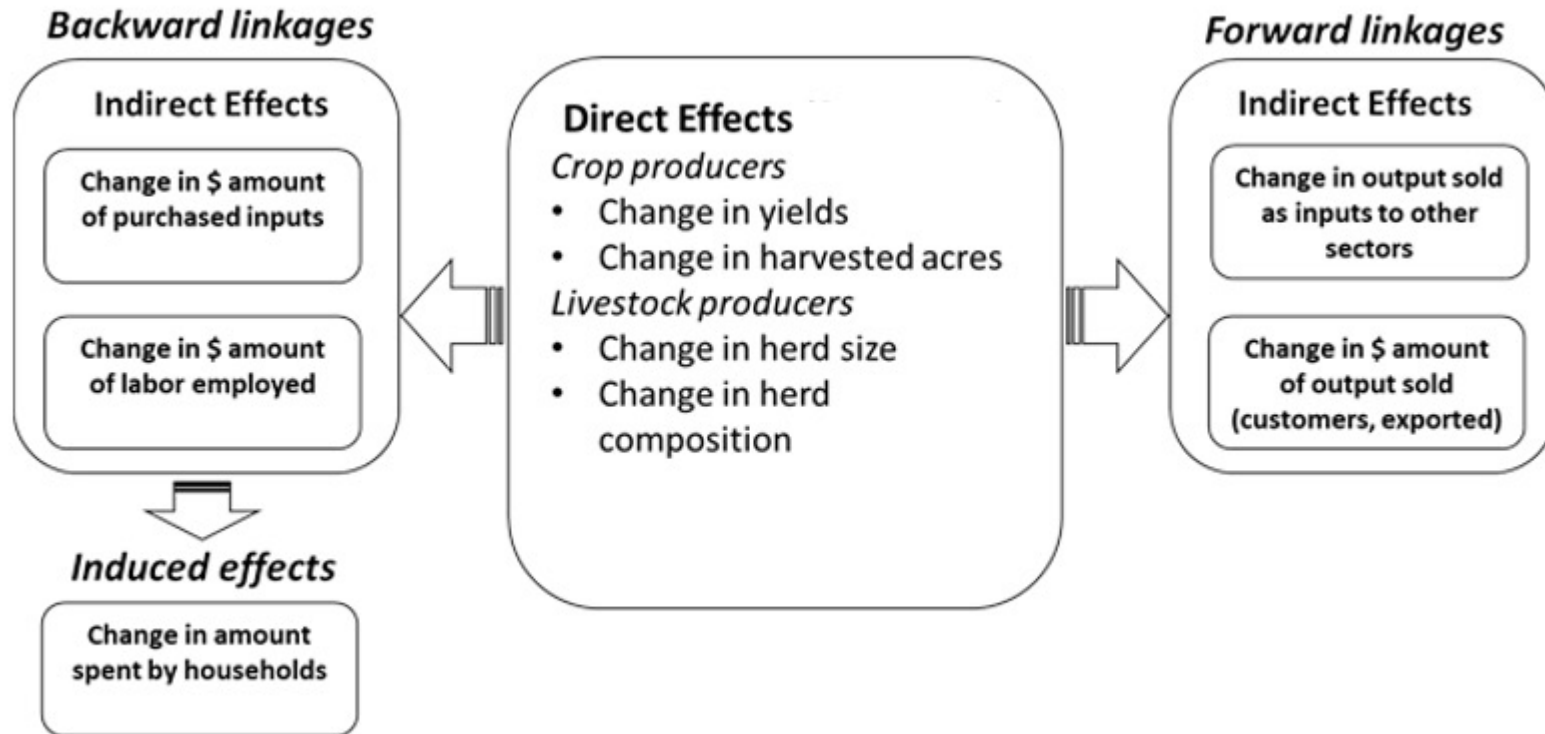
I-O extends theory to sales

- Sales bring income into a region
- Income generates multiplier effect when respent locally
- Effect size determined by additional rounds of local purchasing



Input-Output Analysis

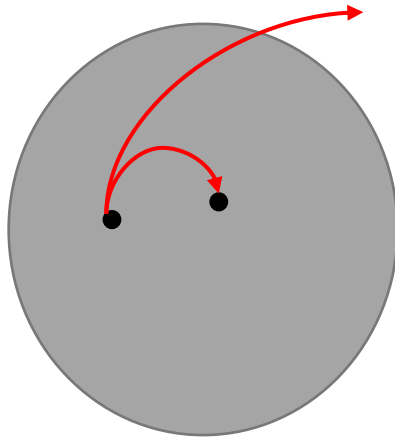
Types of Effects



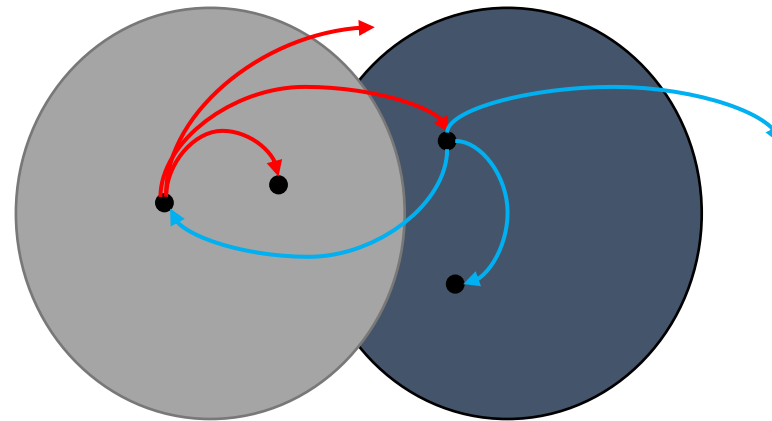
MRIO – Multi-Regional Input-Output

- Direct effects in one region triggers indirect and induced effects in nearby regions
- MRIO captures these effects in linked regions by extending the concept of backward linkages

Single Region

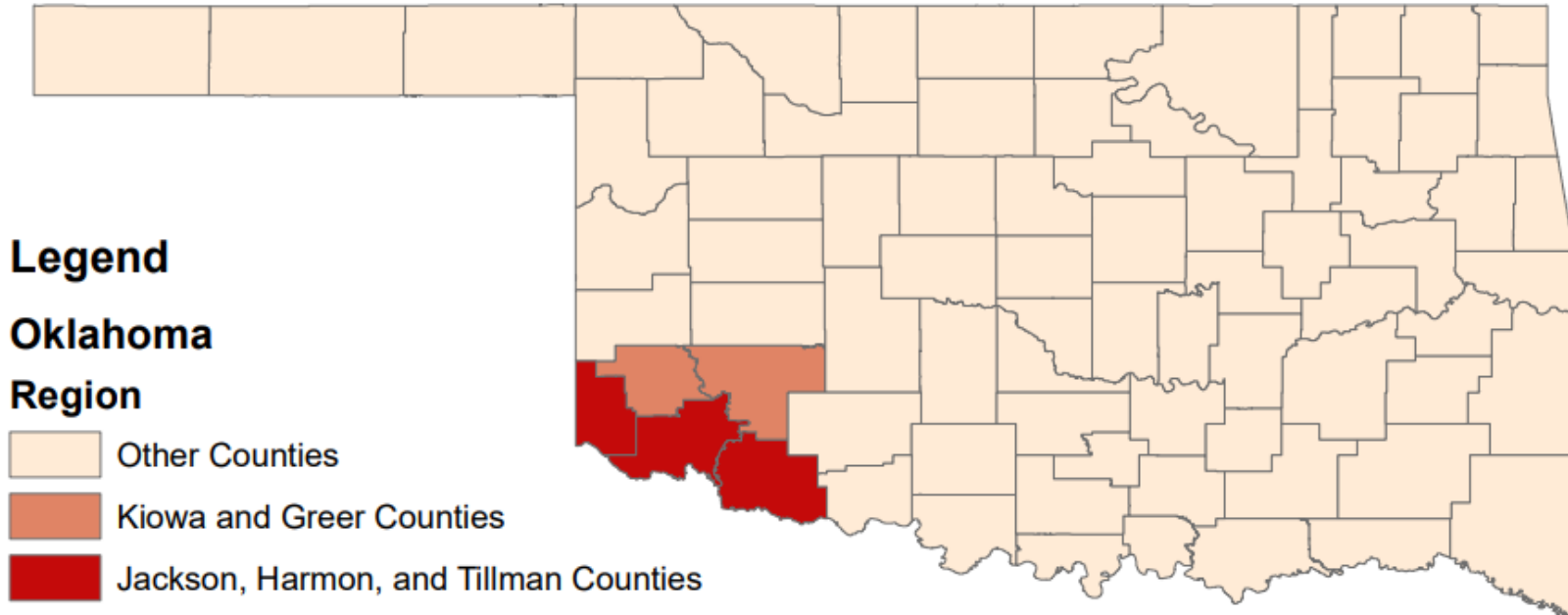


Multiple Regions





Study Region





Data

- United States Department of Agriculture (USDA)
 - Farm Service Agency (FSA)
 - National Agricultural Statistics Service (NASS)
 - Risk Management Agency (RMA)
- Bureau of Economic Analysis (BEA)
- IMPLAN
 - Economic data, model platform



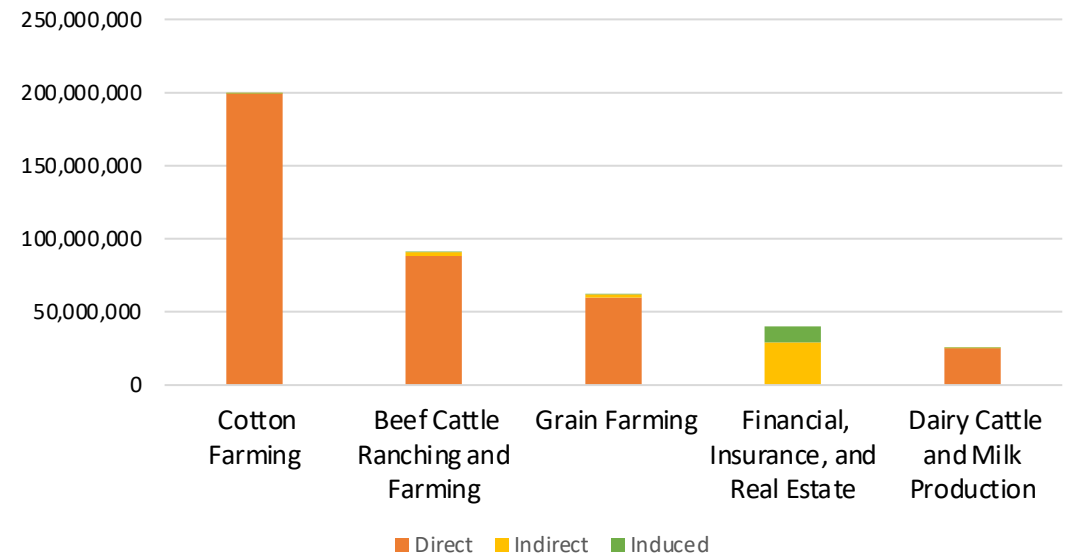
Contribution of Agricultural Sectors

Jackson, Harmon, and Tillman Counties

- What does the existing activity of the ag sectors contribute to Oklahoma's economy?
- What if these industries did not exist → resulting effects on employment, output, and value added

Employment (# of jobs)	Output (\$ millions)	Value Added (\$ millions)
2820	518	175

Top 5 Output Industries



Source: Authors' calculations



Impact Calculation

- Crop
 - *Drought Loss = Actual Revenue – Potential Revenue*
 - Bauman et al. 2013
 - *Potential Revenue = Planted Acres × Avg % Harvested × Avg Yield × Price*
- Crop including insurance indemnity
 - *Drought Loss = Actual Revenue – Potential Revenue + indemnity payment*
- Livestock
 - Change in the value of inventory - BEA



Drought Impact Estimation 2011-2013

Jackson, Harmon, and Tillman Counties

Sector	Commodity	Impact (\$ millions) 2011	Impact (\$ millions) 2012	Impact (\$ millions) 2013	Impact (\$ millions) 2014
Grain	Wheat	-13.7	18.3	-28.2	-28.6
Grain	Corn	-2.5	-2.9	-1.5	-0.4
Cotton	Cotton	-101.4	-25.9	-23.2	-0.7
Other Ag	Hay	-1.4	-3.4	-1.0	-0.9
Livestock		-16.8	-7.7	2.8	10.4



Drought Impact Results 2011-2014, 2018

Jackson, Harmon, and Tillman Counties

Year	Output (\$ millions)	Employment (jobs)	Value Added (\$ millions)
2011	-223	-2200	-112
2012	-31	-458	-20
2013	-89	-1041	-40
2014	-36	-310	-18
Total	-379	-4009	-190
2018	-167	-965	-73
Total	-549	-4974	-263



Drought Impact Results (RMA) 2011-2013

Jackson, Harmon, and Tillman Counties

Year	Output (\$ millions)			Employment (jobs)			Value Added (\$ millions)		
	Impact	Impact + RMA	% Reduction	Impact	Impact + RMA	% Reduction	Impact	Impact + RMA	% Reduction
2011	-223	-123	45%	-2200	-1219	45%	-112	-65	42%
2012	-31	-7	77%	-458	-176	62%	-20	-7	65%
2013	-89	9	110%	-1041	-5	99%	-40	0.5	101%
Total	-343	-121	65%	-3699	-1400	62%	-172	-71.5	58%



Conclusions

- Total drought impacts included -\$379 million in output, -4009 jobs, and -\$190 million in value added over 2011-2014
- Mitigating effects
 - 2012 – bumper wheat crop
 - 2013 – record high cattle prices
 - Insurance indemnity payments
- Future work
 - Extend analysis over time and link to water availability