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**ANNUAL REPORT**

of the

**Central States Center for  
Agricultural Safety and Health**

University of Nebraska Medical Center  
College of Public Health

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## Produced by

Central States Center for Agricultural Safety and Health  
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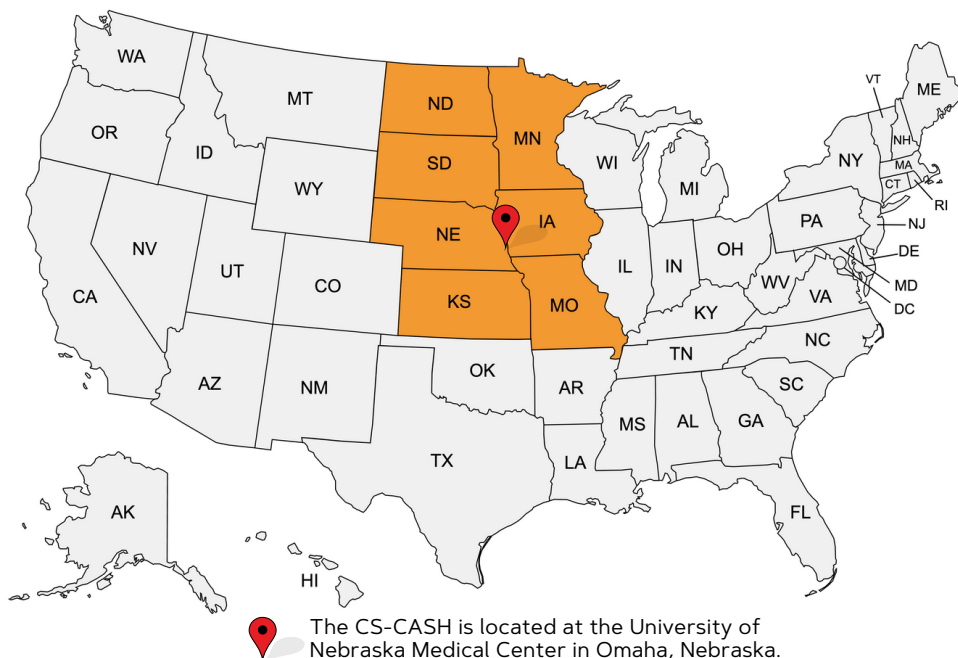
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## Center Summary

The Central States Center for Agricultural Safety and Health (CS-CASH) conducts high quality research and translates scientific discoveries into practical applications to reduce the burden of injury and illness among farmers, ranchers, their families, and workers. CS-CASH, with a strong network of collaborators, provides regional leadership in research and outreach. Research teams from several states and institutions bring multi-disciplinary expertise and access to special populations. With our advisors and partners, we can leverage the Center's resources to address local, regional and national issues. CS-CASH has built a cohesive approach that links planning, evaluation, research, and outreach to reduce agricultural occupational injury and illness. The Center's Planning and Evaluation Core provides strategic direction, administration, and evaluation and it responds to emerging issues. The Research Core conducts basic, intervention, translation, and surveillance research. The Research Core also manages pilot/feasibility projects with substantial in-kind support from UNMC. The Outreach Core has a special emphasis on vulnerable populations: women, veteran farmers, immigrant workers, and Native Americans. Several Center projects address health and safety in feedyard and livestock production work, a major gap in previous efforts of the Ag Centers. CS-CASH has collaborative agreements with several other Centers to work on issues of mutual importance. CS-CASH is well established with a clear vision, mission, goals, organization, and service area.

## Center Relevance

The CS-CASH serves a highly productive agricultural region: North Dakota, South Dakota, Nebraska, Kansas, Minnesota, Iowa, and Missouri. CS-CASH partners with NIOSH, other Ag Centers, and agricultural stakeholders, and works towards fulfilling our common mission to improve health and safety and reduce the burden of injury and illness in agriculture.



# Key Personnel

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Kelsey Irvine, MPH, CPH	Communications Specialist	kepalm@unmc.edu



## External Advisory Board

The external advisory board for the Central States Center for Agricultural Safety and Health provides strategic planning, guidance, and advice. The advisors serve as force multipliers to enhance the center’s effectiveness, expanding the Center’s reach, and increasing the sustainability of center efforts.

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Marilyn Adams	Founding President, Farm Safety 4 Just Kids	Earlham, IA
Denise Andress	Director, Western North Dakota AHEC	Hettinger, ND
Alfredo DiCostanzo	Beef Systems Extension Educator, University of Nebraska Lincoln Extension	Westpoint, NE
Dr. Nathan Fethke	Deputy Director, Great Plains Agricultural Health Center	Iowa City, IA
Brad Forristall	Farmer & Agribusiness Owner	Carson, IA
Karen Funkenbusch	Extension Director, University of Missouri	Columbia, MO
Dr. Roger Hoy	Professor of Biological Engineering, University of Nebraska at Lincoln	Lincoln, NE
Angela Johnson	Extension Coordinator Farm and Ranch Safety, North Dakota State University	Fargo, ND

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## External Advisory Board, continued

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Mike Keenan	Senior VP Loss Control Services, Gallagher Insurance	Omaha, NE
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Allison Keyser Metobo	Epidemiologist, Nebraska Department of Health and Human Services	Lincoln, NE
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Dr. Steven Kirkhorn	Director, Occupational and Environmental Medicine Academic Program, Midwest Center for Occupational Health and Safety	Minneapolis, MN
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Tawnie Larson	Project Coordinator, Kansas State University Department of Biological and Agricultural Engineering, AgrAbility	Manhattan, KS
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Bonita Lederer	Director of Producer Education, Nebraska Cattlemen	Lincoln, NE
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Brad Rein	USDA - retired	
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Derry Stover	Injury Epidemiologist, Nebraska Department of Health and Human Services	Lincoln, NE
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Cheryl Tevis	Journalist and Founding Member of Iowa Women in Agriculture	Pilot Mound, IA
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# Improving Safety Climate and Safety Culture in the Cattle Feedyard Industry

Dr. Aaron Yoder

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## Project Aims

- 1. Identify the motivators and barriers to conducting safety trainings on cattle feedyards.**
  - **Conduct interviews of current and potential users of the Feedyard 15 commendation program about motivators and barriers to safety trainings on feedyards**
  - **Expand and adjust the membership of the Feedyard Safety Advisory Board to gather additional input**
- 2. Develop and implement a new safety climate and safety culture survey tool for cattle feedyards.**
  - **Obtain qualitative information about safety culture on feedyards using multi sited ethnography**
  - **Develop, implement, evaluate, and disseminate a new safety climate survey tool for feedyards, based on validated tools used in other industries**
- 3. Develop, disseminate, and evaluate an open source Feedyard 15 online commendation program.**
  - **Expand and adapt the current bilingual feedyard worker safety and health training program and materials for online delivery to registered users based on surveillance data and their needs**
  - **Promote and support the adoption of the training program at feedyards nationwide**
  - **Evaluate the effectiveness of the online Feedyard 15 training and commendation program through qualitative user feedback and quantitative worker safety climate survey results**

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## Significance

For more than a decade, agriculture has been the most hazardous industry in the US. In 2019, the occupational fatality rate was 109 fatalities per 100,000 workers in the beef cattle ranching and farming industries (including feedyards). This rate was five times higher than the rate in the agriculture, forestry, and fishing sector overall (23.1 per 100,000) and 33 times higher than the rate in all industries combined (3.5 per 100,000). The cattle feedyard subsector also has exceptionally high non-fatal injury and illness rates. In 2020, beef cattle ranching and farming (including feedyards) had a “days away from work, job restriction or transfer” rate of 29 per 1,000 full-time equivalent workers, while the overall agriculture, forestry, and fishing rate was 31, and the all-industries combined rate was 18. These high injury, illness, and fatality rates may be partly due to high turnover among feedyard employees. Many enter the industry with little experience and no safety training and arrive from other countries with limited English language skills.

The industry is competitive, requiring owner operators to improve their efficiency. Labor represents a major part of the production costs, and high Workers' Compensation premiums add to the costs. There is increasing recognition that reducing injuries and illnesses among workers is a critical part of retaining a skilled workforce, decreasing losses, and improving sustainability of the operation. This has become even more apparent during the COVID-19 pandemic.

Feedyard safety is a major focus of the Central States Center for Agricultural Safety and Health (CS-CASH) with the development of the Feedyard 15 commendation program. CS-CASH is ideally located to conduct such research as half of the feedyards in the US are in the Center's region. In 2020, the Center's seven-state region (IA, KS, MN, MO, NE, ND, and SD) had 582 cattle feedyards and 7,252 feedyard employees. This represents 52.2% of all feedyards and 49.5% of feedyard workers in the US. CS-CASH has funded several projects addressing the safety and health of livestock workers, and the research team has experience in developing, implementing, and evaluating interventions in the feedyard industry, guided by the Feedyard Safety Advisory Board (FSAB) of major stakeholders. Their input emphasized the need for enhanced safety training and resources to manage safety. Based on the recommendations from the FSAB, the long-term goal of this project is to reduce the burden of injuries and illnesses among feedyard workers. The objective of this project is to improve safety climate and safety culture on cattle feedyards through the adoption of a comprehensive feedyard safety and health training and commendation program.

## Accomplishments

### Ethnography

Project ethnographer, Dr. Ryan Klataske, collects safety culture information from feedyard managers and workers on feedyards; from both those that use the Feedyard 15 materials as part of their safety training as well as those that do not. Using a research method known as multi-sited ethnography, Dr. Klataske has been able to gather data directly from workers on why they may or may not implement safety practices. A manuscript is in the works on these findings.

### Safety Culture Survey

The project team is currently working on developing a motivators and barriers survey as part of their new safety climate and culture toolkit.

### Wearable Technologies

As part of exploring safety climate and culture on feedyards, we are evaluating the use of wearable technology adoption on feedyards. This research is being conducted in collaboration with feedyard managers, workers, and a national technology company.



An example of wearable technology.

## Feedyard 15 Resources

The Feedyard 15 (FY-15) training resources are PowerPoints, flyers, videos, and stories, in both English and Spanish, that address the top 15 hazards on feedyards. These materials were developed over the past 6 years by the research team and collaborators. FY-15 resources are accessed free of charge via the FY-15 website.



Use of the materials by feedyards is incentivized by a commendation program that provides safety related gifts to workers and managers who complete the trainings, such as high visibility safety hats and vests and multi-use tools. FY-15 training materials are currently being used by 29 feedyards across 11 states. The project team continues to review existing safety and health programs and materials that apply to feedyard workers. New materials are added to the Feedyard 15 website regularly. Feedyards continue to be recruited to participate in this commendation program.

**11** states

**29** feedyards



**2,739** employees

**1,937** training hours



### CHECK OUT THE FEEDYARD 15 WEBSITE

Visit <https://go.unmc.edu/feedyard-15>

Or use your smartphone to scan the QR code.





## Marketing & Media

The Feedyard 15 training and commendation program, as well as other parts of the project, have been presented to the beef industry and safety and health professionals through trade- and peer-reviewed publications and professional conference presentations. Working with ag-journalist Loretta Sorensen, 10 feedyard related safety and health articles have been written and released via Associated Press to media outlets across the U.S.

## Publications

Ramos AK, Adhikari S, Rautiainen R, **Yoder A.** (2022). Protecting cattle feedyard workers in the Central States region: Exploring state, regional, and national data on fatal and nonfatal injuries in agriculture and the beef production sector. *Journal of Extension*, 60(3): Article 13. <https://doi.org/10.34068/joe.60.03.13>

## Posters & Presentations

Vansickle J, **Yoder A.** (2022). Environmental and Occupation Exposure Assessment of Cattle Feedyard Workers Using Wearable Technology. Midwest Rural and Agricultural Safety and Health Conference. November 2022.

Adhikari S, **Yoder A.**, Rautiainen R, Ramos A, Keenan M. (2023). Burden of Injuries on Cattle Feedyards in the United States. International Society for Agricultural Safety and Health Conference. Tampa FL. June 2023.

## Media Releases

- Slips, Trips, Falls: Reduce the Potential
- Cold weather hydration
- Prevent heat illness
- Prevent electrocution
- Confined space safety
- Skid Steer Loader
- Skid steer loader
- Feedmill safety
- Progressive Cattlemen: Immigrant Worker Training
- Farm Shop Safety

### VIEW ALL MEDIA RELEASES



Visit [go.unmc.edu/cs-cash-news](https://go.unmc.edu/cs-cash-news)

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## Agricultural Journal Articles

- Addressing risks and language barriers for immigrant feedyard workers (Progressive Cattle)
- Wearable heading to agriculture (Agri-View)
- Horsemanship and safety in the feedyard (Progressive Cattle)
- Initial and periodic safety training in the feedyard (Progressive Cattle)



### CHECK OUT THE AGRICULTURAL JOURNAL ARTICLES

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# Multiple Methods Approach to Study the Impact of Stress among Latino Immigrant Cattle Feedyard Workers in the Central States Region

Dr. Athena Ramos

## Project Aims

1. Examine the interrelations among severe stress within domains (e.g., work, immigration, pandemic), perceived and physiological stress, occupational injuries, physical (e.g., biomarkers) and psychosocial (e.g., depression, anxiety, psychological well-being) health, and social well-being outcomes (e.g., job satisfaction, prosocial behaviors).
2. Investigate whether risk and protective factors mediate or moderate the links among severe stress, perceived and physiological stress, and occupational injuries, physical and psychosocial health, and social well-being outcomes.
3. Explore whether changes in severe, perceived and physiological stress across time are linked to changes in occupational injuries, physical and psychosocial health, and social well-being outcomes across time.
4. Develop, pilot, and disseminate evidence-based bilingual health and safety materials for cattle feedyard workers.



## Significance

Cattle production is one of the most important industries in the United States, particularly in the Central States region of the country. Thousands of workers are employed on cattle feedyards, and many of these workers are at risk for chronic health conditions and work-related injuries. Understanding risk and protective factors may help in keeping workers healthy, safe, and productive over the long-term.

## Accomplishments

This longitudinal study has three core components: health assessments, worker interviews, and in-depth conversations. First, as part of this project, our team is conducting health fairs onsite at participating feedyards. To promote the health fairs, we developed a bilingual flyer and video about what to expect. This video is shared with participating feedyards and can be shared easily with workers. At the health fairs, we assess height, weight, body mass index, blood pressure, cortisol, lipids, lung function, and cardiorespiratory fitness. To date, we have conducted five feedyard health fairs. All workers who participate in the health fair receive their health results. Some results are available onsite, while others have to be processed in the lab. For those that are processed in the lab, results are mailed to workers along with a link to a bilingual video that describes more about the meaning of the test results. We also provide educational resources and connections to local healthcare providers for follow-up if necessary. Thus far, we have had 88 feedyard workers participate in the health assessments. Some workers are invited for the second phase of this study, which includes a structured interview with a member of the research team. These interviews are conducted outside of the work environment and address physical, mental, and social well-being. Thus far, we have completed 17 structured interviews.



Top: Workers receiving health assessments  
 Right: Screenshots of the onsite health report card that is provided to workers with the health assessment results

**Lung function**

Normal  
 Abnormal

**3-minute step test**

Excellent  
 Good  
 Above Average  
 Average  
 Below Average  
 Poor  
 Very Poor

### Your Health Report

Name \_\_\_\_\_

Date \_\_\_\_\_

Cattle Feedyard Worker Health Study  
 IRB# 730-22-EP

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Dr. Athena Ramos Principal Investigator	(402) 559-9660 aramos@unmc.edu
Dr. Sheri Rowland Clinical Leader/Co-Investigator	(402) 472-5959 sheri.rowland@unmc.edu

<https://www.unmc.edu/publichealth/feedyard/>

Funding for this study was provided by the National Institute for Occupational Safety and Health, grant # 10A08001042.

---

**Lung function**

Normal  
 Abnormal

**3-minute step test**

Excellent  
 Good  
 Above Average  
 Average  
 Below Average  
 Poor  
 Very Poor

### Your Health Report

Name \_\_\_\_\_

Date \_\_\_\_\_

Cattle Feedyard Worker Health Study  
 IRB# 730-22-EP

Research Study Team	(402) 559-3670 AgCenter@unmc.edu
Dr. Athena Ramos Principal Investigator	(402) 559-9660 aramos@unmc.edu
Dr. Sheri Rowland Clinical Leader/Co-Investigator	(402) 472-5959 sheri.rowland@unmc.edu

<https://www.unmc.edu/publichealth/feedyard/>

Funding for this study was provided by the National Institute for Occupational Safety and Health, grant # 10A08001042.

Suggested Follow-Up:




Our team has worked to improve the language accessibility of agricultural safety and health resources for farmworkers. We have developed a bilingual feedyard picture glossary and have translated numerous CS-CASH resources into Spanish.



**ACCESS THE BILINGUAL FEEDYARD PICTURE GLOSSARY**

Visit <https://go.unmc.edu/feedyard-picture-glossary>.

Or use your smartphone to scan the QR code.



We are also working to develop and grow relationships with beef industry partners across the region. We have participated in the Nebraska Cattlemen’s Ball and some county cattle feeders’ association meetings. Some of our trainees have also participated in an introduction to production agriculture class offered at the University of Nebraska-Lincoln so that they can have a better understanding of production processes and the industry in general.

We are optimistic as we move forward with data collection and building partnerships. We look forward to the positive impact that this project can have on feedyard workers, management, and the beef industry.



## Publications

**Ramos AK**, Adhikari S, Rautiainen R, Yoder A. (2022). Protecting cattle feedyard workers in the Central States region: Exploring state, regional, and national data on fatal and nonfatal injuries in agriculture and the beef production sector. *Journal of Extension*, 60(3): Article 13. <https://doi.org/10.34068/joe.60.03.13>

Schofield K, **Ramos AK**, Weichelt B, Bent B. (2023). Realities of workers' compensation coverage for agricultural workers: Before, during, and into the future of the COVID-19 pandemic. *Journal of Agromedicine*, 28(1):69-72. doi: 10.1080/1059924X.2022.2147624 PMID 36396619

Bendixsen CG, **Ramos AK**, Holmes SM. (2023) Structural competency and agricultural health and safety: An opportunity to foster equity within agriculture. *Journal of Agromedicine*, 28(1):45-52. doi.org/10.1080/1059924X.2022.2148148

**Ramos AK**, Reynaga D. (2023). The TN Visa: The future of foreign workers in livestock production. *Journal of Agromedicine*, 28(1):81-85. doi: 10.1080/1059924X.2022.2140734 PMID: 36284467

Carlo G, McGinley M, Maiya S, **Ramos AK**. (2023). Association of work-related injuries and stress to family and youth wellbeing among U.S. Latino/a immigrant cattle feedyard workers. *International Journal of Environmental Research and Public Health*, 20(4):3361. doi.org/10.3390/ijerph20043361 PMID 36834054 PMCID: PMC9962635

Rowland SA, **Ramos AK**, Trinidad N, Quintero S, Johnson Beller R, Struwe L, Pozehl B. (2022). Feasibility, Usability and Acceptability of a mHealth Intervention to Reduce Cardiovascular Risk in Rural Hispanic Adults: Descriptive Study. *JMIR Formative Research*, 6(12):e40379. doi: 10.2196/40379 PMID: 36563025 PMCID: PMC9823566.

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## Other Forms of Media

Great Plains Center for Agricultural Health FarmSafe Podcast, Season 2, Episode 11: Cattle Feedyard Safety: Stop, Think, Then Act  
Listen here: [https://gpcah.public-health.uiowa.edu/cattle\\_feedyard\\_safety/](https://gpcah.public-health.uiowa.edu/cattle_feedyard_safety/)

Great Plains Center for Agricultural Health FarmSafe Podcast, Season 2, Episode 12: Cattle Feedyard Safety: Safety Climate Improvement Strategies  
Listen here: <https://gpcah.public-health.uiowa.edu/cattle-feedyard-safety2/>

# The Exposome and Organic Dust-Induced Lung Injury

Dr. Todd Wyatt

## Project Aims

- 1. Determine the mechanism of swine barn dust on increased viral infectivity of SARS-CoV-2 using both human and mouse models of lung primary epithelial cells and organoids.**

We hypothesize that organic dust activates ADAM-17 and increases ACE2 expression and function leading to increased viral infectivity. We will then characterize changes in SARS-CoV-2 binding and infection under conditions of dust injury interventions targeting ADAM-17 with IL-10, an endogenous anti-inflammatory agent.

- 2. Determine the mechanism of enhanced dust-mediated lung infection injury with alcohol exposure.**

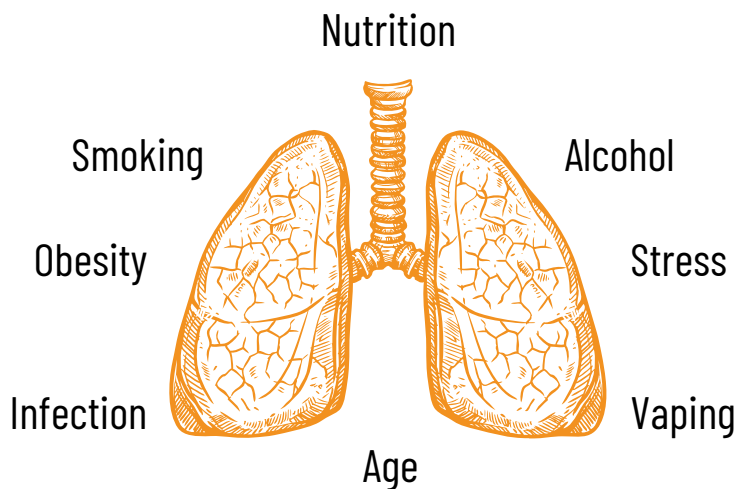
We hypothesize that reactive aldehydes derived from liver extracellular vesicles (EV) after alcohol exposure decrease the lung innate response to dust injury and promote pneumococcal pneumonia. Using liver EV to deliver alcohol-metabolizing enzymes to the lung, we will examine the mechanisms of increased *S. pneumoniae* infection and decreased innate defense in mice as well as human lung cells and organoids exposed to swine barn dust. We will use the aldehyde-trapping drug, ADX-102, to explore a therapeutic intervention to alcohol-enhanced dust injury.

- 3. Determine the role of gut-derived bacterial outer membrane vesicles (OMV) and the mechanism of zinc deficiency in dust-mediated lung injury in response to bacterial infection.**

We hypothesize that zinc supports gut-derived vesicles protective against dust-injured innate lung defense. We will use mouse models of zinc sufficient and deficient conditions and mechanisms of innate cellular defense defined.

## The Agricultural Exposome:

How do environmental exposures impact innate lung defense?





## Significance

Agricultural workers have a real-world variety of exposures that take place outside the workplace. However, the essence of the exposome is that it is the sum of our myriad exposures throughout the course of our lives that collectively impacts health. The impact of our project considering the complexities of multiple exposure conditions rather than a reductionist approach which only examines organic dust exposure will hopefully enable our research finding to translate to real-world human exposures and the manifestation of chronic inflammatory lung disease. Specifically, we hope to address the contribution of additional injurious exposures such as drinking and smoking on occupational inhalation injury as well as the potential benefit of zinc supplementation at protecting against such injury.

## Accomplishments

Significant advancements have been made during this first year of the award project period. For this study, we will examine exposomal factors that might negatively impact inhaled agricultural dusts in the workplace. This specifically brings an examination of cigarette smoking, alcohol consumption, and nutritional zinc deficiency to bear in our studies on dust-mediated lung injury. Work on Aim 1 is proceeding with data now generated showing increased dust-mediated SARS-CoV-2 infection in vitro. These results were presented at the American Thoracic Society Conference in 2023 and a manuscript is pending. Similarly, we have recently been successful at showing protection against dust-mediated cilia slowing through zinc supplementation using a mouse model. A presentation on these findings was made at the 2023 ISASH Conference. Ground work has begun on Aims 2 and 3 of this award. An extracellular vesicle analyzer (Izon, Inc) was purchased through funds made available by the Department of Veterans Affairs and initial experiments to establish the parameters of EV analysis begun. The “triple-hit” model was presented to the VA at the regional VISN Conference in 2023.

## Presentations

Ramler E, Mikuls TR, Thiele GM, Nelson AJ, Duryee MJ, Gaurav R, **Wyatt TA**, Schwab A, Hunter C, England BR, Poole JA. Combination of repetitive inhaled endotoxin exposure and collagen-induced arthritis interact in a testosterone-dependent manner to drive inflammatory lung processes and arthritis severity in mice. ACR (American College of Rheumatology) meetings, Philadelphia, PA, November 11-14, 2022.

Villageliú, D, Cunningham K, Smith D, Ellis C, Knoell D, **Wyatt TA**, Ramer-Tait AE, Price JD, Samuelson D. Humanized alcohol-microbiota mice have increased susceptibility to respiratory infection. Gordon Research Conference on Alcohol-Induced End Organ Diseases, Ventura, CA, March 26-31, 2023.

**Wyatt TA**, Muralidharan A, Bauer CD, Nissen CG, Bailey KL, Poole JA. Low-dose organic dust exposure enhances SARS-CoV-2 entry in a PKC $\alpha$ - and ADAM-17-dependent manner. ATS 2023 Conference, Washington DC, May 19-24, 2023.

**Wyatt TA**, Bailey KL, Samuelson DR, Knoell DL. Triple-hit model of alcohol, zinc deficiency, and cigarette smoke exposure impairs lung inflammatory and immune responses. RSA 2023, Bellevue WA, June 24-28, 2023.

**Wyatt TA**, Samuelson DR, Knoell DL. Zinc Protects Against Swine Barn Dust-induced Cilia Slowing. ISASH 2023, Tampa FL, June 17-21, 2023.

**Wyatt TA**, Bailey KL, Samuelson DR, Knoell DL. Triple-hit model of alcohol, zinc deficiency, and cigarette smoke exposure impairs lung inflammatory and immune responses. VISN 23 Research Symposium FY2023, Minneapolis, MN, August 8-9, 2023.

Schwab AD, **Wyatt TA**, Nelson AJ, Gleason AM, Romberger DJ, Poole JA. Lung-delivered rIL-10 therapy beneficially impacts agriculture-derived organic dust exposure-induced lung inflammation. 2023 Midwest Regional Agricultural Safety and Health Conference, Dubuque, IA, Nov 8-9, 2023.

## Publications

Poole JA, Gaurav R, Schwab A, Nelson AJ, Gleason A, Romberger DJ, **Wyatt TA**. (2022). Post-endotoxin exposure-induced lung inflammation and resolution consequences beneficially impacted by lung-delivered IL-10 therapy. *Scientific Reports*, 12(1):17338. <https://doi.org/10.1038/s41598-022-22346-2> PMID: 36243830 PMCID: PMC9569365

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Johnson AN, Dickinson J, Nelson A, Gaurav R, Kudma K, Evans SE, Janike K, **Wyatt TA**, Poole JA. (2023). Effect of epithelial-specific MyD88 signaling pathway on airway inflammatory response to organic dust exposure. *Journal of Immunotoxicology*, 20(1):2148782. doi: 10.1080/1547691X.2022.2148782 PMID: 36538286 PMCID: PMC9912912

Crotty K, Anton P, Coleman LG, Morris NL, Lewis SA, Samuelson DR, McMahan R, Hartmann P, Kim A, Ratna A, Mandrekar P, **Wyatt TA**, Choudhry MA, Kovacs EJ, McCullough R, Yeligar SM. (2023). Recent knowledge gained in alcohol and the immunological response across tissues. *Alcohol Clinical & Experimental Research*, 47(1):36-44. <https://doi.org/10.1111/acer.14979>

Muralidharan A, Bauer CD, Katafiasz DM, Strah HM, Siddique A, Bailey KL, Reid SP, **Wyatt TA**. (2023). Synergistic detrimental effects of cigarette smoke, alcohol, and SARS-CoV-2 in COPD bronchial epithelial cells. *Pathogens*, 12(3): 498; <https://doi.org/10.3390/pathogens12030498>

Gibbs JL, Sheridan C, Sullivan D, Rautiainen R, Nonnenmann MW, **Wyatt TA**. (2023). Self-reported respiratory health symptoms and respiratory protection behaviors of young adult hog producers in the United States. *American Journal of Industrial Medicine*, 66(9):794-804. <https://doi.org/10.1002/ajim.23515> PMID: 37443418

Cunningham KC, Smith DR, Villageliú DN, Ellis CM, Ramer-Tait AE, Price JD, **Wyatt TA**, Knoell DL, Samuelson MM, Welsh DA, Samuelson DR. (2023). Human alcohol-microbiota mice have increased susceptibility to bacterial pneumonia. *Cells*. doi: 10.3390/cells12182267 PMID: 37759490 PMCID: PMC10526526

# Establishing a Community-Based Training Network to Enhance the Safety of Bison Herd Workers on Tribal Lands

Dr. Mystera Samuelson

## Project Aims

1. **Characterization of workplace injuries, working conditions, and safety hazards for workers handling bison under contemporary reservation field conditions.**
2. **Develop and distribute functional educational materials including established intervention strategies to mitigate worker safety risks.**
3. **Facilitate the development of an indigenous-led training and mentorship program focused on worker and herd health from the OneHealth perspective**

## Significance

The major goals of this project include providing targeted, culturally appropriate, training for Indigenous bison herd workers to reduce injuries incurred on Tribal-owned bison ranches.

## Accomplishments

This project continues and refines previous efforts to impact bison herd worker health. In this funding year, we have worked closely with the InterTribal Buffalo Council (ITBC) to identify willing mentors and mentees within the community to hold and attend applied trainings. Further, we held the annual Roundtable in Flandreau, SD. During this time, our team and participants were invited to participate in a cultural harvest of a bison – which facilitated the teaching of both safety practices associated with large animal processing in the field, and also showcased the use of the ITBC Mobile Cultural Processing Unit. This work was documented and featured on Dakota Life.



### WATCH THE ITBC CULTURAL HARVEST

Visit <https://youtu.be/y-6CRclaYj8>

Or use your smartphone to scan the QR code.



During our Roundtable event, our team led a workshop on training materials used to teach safety measures in the form of our “Tailgate Training.” We discussed and took input on the ways in which we can update these materials to be more culturally appropriate and identified other areas for improvement.

The annual Roundtable summary is produced following each meeting and available via the UNMC CS-CASH website and disseminated to participants and other ITBC members via e-mail. A tribal community advised safety manual is being developed.

Investigators forged additional connections with associated nonprofit organizations, such as The Nature Conservancy, to form additional support for Tribal Bison Herd Workers.

We work with the Intertribal Buffalo Council (ITBC) to distribute findings and materials associated with this work via regular community updates, as well as through our annual meeting. Further collaborations with The Nature Conservancy will also enhance our ability to disseminate our messaging throughout non-ITBC member tribes, considering the conservancy’s new commitment to distributing bison to Tribal Nations.



**LEARN MORE ABOUT THIS WORK**

Visit <https://go.unmc.edu/bison>

Or use your smartphone to scan the QR code.



We have worked with ITBC to reach their membership of over 80 federally and state recognized Tribes across the central states region and beyond. Participants include both Tribal members as well as non-tribal members who work with the Tribes to plan for the management of established and newly acquired bison herds housed on Tribal land. We have been able to demonstrate a need for the equipment and infrastructure necessary to employ best practices in large animal management, which has led us to be able to address current solutions and long-term goals for infrastructure improvements to these programs.

**ABOUT THE INTERTRIBAL BUFFALO COUNCIL**

The InterTribal Buffalo Council (ITBC) is a collection of 80 tribes in 20 different states that facilitates the management of over 20,000 buffalo. Its members manage more than 32 million acres of Tribal lands, and have restored buffalo to nearly 1 million of those acres. From the large intact grasslands of Montana, to the small desert herds of New Mexico, ITBC is committed to reestablishing buffalo herds on Tribal lands in a manner that promotes cultural enhancement, spiritual revitalization, ecological restoration, and economic development.





# Evaluating the Safety of Agricultural Vehicle Ingress/Egress for Aging Producers

Dr. Bethany Lowndes

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## Project Aims

1. Determine variability of agricultural vehicle ingress and egress patterns and safety behaviors.
2. Measure performance of agricultural vehicle ingress and egress for individuals aged 40 years and over.
3. Design fall-prevention design interventions and assess feasibility to address safety risks associated with agricultural vehicle ingress/egress.

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## Significance

Falls from agricultural vehicles for aging producers may result in serious, potentially career-ending, injuries. This research leverages novel observational techniques and an assessment of strength, balance, and ingress/egress performance to design user-centered interventions for the reduction of producer fall and injury.

This project received funding in Fall 2023; progress will be reported in our next Annual Report.





# Surveillance of Agricultural Injuries

Dr. Risto Rautiainen

## Project Aims

- 1. Implement and evaluate the utility of annual regional surveys of injuries, illnesses, exposures, preventive measures, and emerging risks among self-employed farmers and ranchers, merged with their farm production variables from an existing agricultural database.**
- 2. Prospectively identify changes in the prevalence of positive screens for mental health conditions and evaluating the association of mental health and injury among young adult agricultural producers.**
- 3. Collecting print and electronic media information of agricultural injuries and fatalities and disseminating the findings via a) the AgInjuryNews web interface, b) summary reports by state and topic, c) case-based media stories, and d) responding to data requests from the media and general public.**

## Farm & Ranch Health & Safety Survey

CS-CASH conducts periodic Farm and Ranch Health and Safety Surveys (FRHSS). The questionnaire asks for information on up to 3 'producers' on the farm or ranch. The responses are merged with farm production variables obtained from a commercial agricultural data provider. Surveys are sent to a random sample of operations with at least \$5,000 in annual sales, stratified by state, in the Center's seven-state region.

Injury questions include:

- Incident location
- Source of injury
- Body part(s) affected
- Lost time due to injury
- Type of medical care
- Costs for care

Questions on chronic health conditions include respiratory diseases, hearing loss, skin diseases, work strain symptoms, and musculoskeletal symptoms. The exposure questions are matched with chronic health conditions, and the preventive practices include using personal protective equipment when exposed.

## Survey of Young Adult Agricultural Workers

Dr. Josie Rudolphi, at the University of Illinois, surveys young adult agricultural producers. This study is designed to identify the prevalence of common mental health conditions and the relationships between mental health, risk behaviors, and injury. A cohort of young producers (<45) is recruited for a follow-up study. Survey instruments include the Perceived Stress Scale-4, Generalized Anxiety Disorder-2 (GAD-7), The Patient Health Questionnaire-2 (PHQ-9), and Injury and Near miss questions.

## Injury and Fatality Information from News Clips

The surveillance project also collects, screens, and analyzes relevant print, broadcast, and internet media content on fatal and non-fatal injuries from publicly available media sources. Data collection is coordinated with and disseminated through the AgInjuryNews website and periodic reports to the public.

## 2022-2023 Outcomes

### FRHSS

Data were obtained from US Farm Data for FRHSS surveys. The data contained information on 17,500 operations (2,500 per state, seven states), including their mailing address, and about 30 variables on crops and animals raised. The project team mailed surveys in August 2023, and 1,170 responses were received by August 31, 2023. Data entry is ongoing, and approximately one-third of the responses have been entered. The second mailing to non-respondents will be sent after harvest. Reporting of results from previous surveys continued; notable results included:

- Farmers' safety priorities and actual practices differ in many work situations related to chemicals and machinery.
- The risk of injuries, musculoskeletal symptoms, and stress increases with age up to a change point (in the late 50's) and then decreases.
- Work-related stress is a strong risk factor for agricultural injuries.

### Young Worker Survey

A young adult cohort has been established. Dr. Josie Rudolphi and her team obtained IRB approval from the University of Illinois Urbana-Champaign for data collection, recruitment strategies, and enrollment protocol. The online survey was developed and built in Qualtrics, an online survey system available through the University of Illinois. The online survey includes validated instruments to measure stress (perceived stress scale), symptoms of anxiety and depression (PHQ-4), and questions about work-related injury. From there, Dr. Rudolphi's team recruited young adults between 18 and 45 into the stress, mental health, and injury cohort. Recruitment materials were distributed online via partners and their respective networks (Ag Health and Safety Alliance, Extension, NIOSH agricultural safety and health centers, and agricultural commodity groups). Nearly 410 individuals expressed interest in participating in the cohort, and the research team is currently qualifying individuals based on their age, state of residence, and agricultural involvement.



**YOUNG FARMER**  
RESEARCH OPPORTUNITY

Are you a farmer or rancher between the ages of 18 and 45?

If so, consider participating in our study about **stress, injury, and health.**



**Significance.** This surveillance project addresses a significant problem. Agriculture has a high rate of fatal injuries that has remained relatively high in three decades. The actual rate of non-fatal injuries in agriculture has been unknown due to inadequate surveillance, especially for self-employed farmers and ranchers. CS-CASH surveillance contributes to understanding the true incidence and cost of injuries to farmers and ranchers, the prevalence of work-related chronic health conditions, exposures, and preventive measures, and the safety culture among farmers and ranchers.

## Publications

Beseler CL, **Rautiainen RH.** (2023, online ahead of print). Injury, musculoskeletal symptoms, and stress as a function of aging in agricultural operators in the Central United States. *Workplace Health & Safety*. doi: 10.1177/21650799231186155 PMID: 37542380

Bai H, Beseler C, Baccaglini L, **Rautiainen R.** (2023). Work-related stress as a risk factor for farm injuries in the Central United States. *Journal of Agricultural Safety and Health*, 29(1):1-13. doi: 10.13031/jash.14951

Gibbs JL, Sheridan C, Sullivan D, **Rautiainen R,** Nonnenmann MW, Wyatt TA. (2023). Self-reported respiratory health symptoms and respiratory protection behaviors of young adult hog producers in the United States. *American Journal of Industrial Medicine*, 66(9):794-804. <https://doi.org/10.1002/ajim.23515> PMID: 37443418



# Evaluation

Dr. Cheryl Beseler

## Project Aims

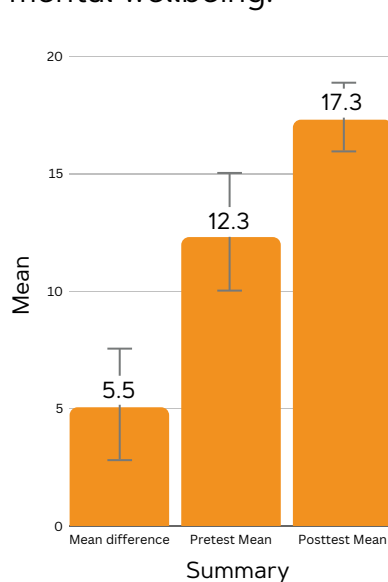
1. **Assess the effectiveness of CS-CASH leadership and governance.**
2. **Conduct quality assurance by tracking CS-CASH Logic Model activities, outputs, and intermediate outcomes.**
3. **Evaluate CS-CASH Logic Model end outcomes for social and economic impacts.**

## Accomplishments

The evaluation team for the CS-CASH monitors the internal coalition effectiveness, as well as the Center's activities, outputs, and outcomes. The evaluation team also assesses each pilot and feasibility project's progress, outcomes, and outputs. In addition to evaluation services, the evaluation team also provides analytical assistance and content expertise to investigators. Dr. Cheryl Beseler, director of evaluation, participated in leading an evaluation workshop at the International Society of Agricultural Safety and Health (ISASH) annual conference in Tampa, Florida, in June 2023. The presentation was titled "Challenges in Evaluation and Monitoring of a NIOSH AgFF Research Center".

## FarmResponse Evaluation

Dr. Beseler assisted with evaluating AgriSafe's FarmResponse, an on-demand interactive course available through AgriSafe's Learning Lab. Healthcare providers who are new to agriculture may not understand the farming culture or the unique stresses and challenges that farmers and ranchers face. Launched in February 2022, the FarmResponse course addresses farm and ranching cultural competencies for healthcare providers and specialists by exploring the effects of financial stress, land ownership and legacy issues, substance use, suicide, and the work of agriculture on mental wellbeing.



The curriculum was shown to increase provider knowledge. Significant increases in knowledge from pretest to posttest was demonstrated in 520 participants (pretest mean = 12.3, SD = 2.73; post-test mean = 17.3, SD = 1.22; mean difference = 5.05, SD = 2.78;  $t = 41.5$ ,  $p < 0.0001$ ). The medians were 12 at pretest (range 3-19) and 17 at posttest (range 16-20). Qualitative analysis of participants responses to applying it to their practices were positive and they reported that they can easily apply it to their work and that it has helped them understand and help those working in agriculture. A paper is in process to report these results and an abstract was submitted to the National Rural Health Association National Conference in New Orleans in May, 2024, to further promote the training among rural nurses.



## Pilot Project Support Successes

### Development of CRC Screening Education Material for Agricultural Workers

PI: Dr. Shinobu Watanabe-Galloway

A paper resulted from this project and an NU Collaborative Initiative grant was awarded for developing an R01 application.

- **Beseler C**, Kim J, Subramanian R, Harris S, Funkenbusch K, Yoder AM, Robinson T, Foster JM, Watanabe-Galloway S. (2023). Exploring barriers and promoters of CRC screening use among agricultural operators: A Pilot Study of an Application of Concept Mapping. *Rural and Remote Health* (in press).

### Website Evaluation of the National Agricultural Safety Database

PI: Dr. Serap Gorucu

The results of this pilot project were presented as a poster at the ISASH annual conference in Tampa, Florida, in June of 2023.

### Modeling the role of weather patterns and grain quality in predicting on-farm engulfments and entrapments

PI: Dr. Gretchen Moser

Three presentations resulted from this project; two at ISASH in 2022 and 2023, and one at ASABE in 2023; along with a paper that is currently in process.

### New ATV safety design features: Examining cultural acceptability and piloting an educational intervention among Midwestern youth in agriculture.

PI: Carolyn Sheridan

A paper resulted from this project.

- Gibbs JL, Sheridan CE, Yoder A, **Beseler C**, Rautiainen R. 2023. Self-reported quad bike behaviors and safety awareness among young adults in U.S. and Canadian agriculture. *Journal of Agromedicine*. 28(1):18-27.

## Additional Publications

**Beseler CL**, Rautiainen RH. (2023, online ahead of print). Injury, musculoskeletal symptoms, and stress as a function of aging in agricultural operators in the Central United States. *Workplace Health & Safety*. doi: 10.1177/21650799231186155 PMID: 37542380

Ouattara BS, **Beseler CL**, Rautiainen RH. (2023). Agricultural injuries: Risk factors and severity by affected body part among US (Midwest) farmers. *Journal of Agromedicine*, 28(2):214-223. <https://doi.org/10.1080/1059924X.2022.2089421> PMID: 35703065



# Pilot & Feasibility Programs

Dr. Eleanor Rogan

The Pilot and Feasibility Program has been an essential component of the Central States Center for Agricultural Safety and Health (CS-CASH) since the Center was established in 2011. This program supports projects with funding up to \$20,000 over 18 months. The program goal is to enable investigators to collect preliminary data to support the submission of grant applications for independent, longer-term, larger projects related to agricultural safety and health. The central hypothesis of this program is that pilot and feasibility projects funded from this Center will result in subsequent grant submissions that advance agricultural health and safety research or will result in development of new safety technologies, products, or enduring resources. The projects selected for support by this program must address a critical issue in agricultural safety and health. In addition to NIOSH AFF (Agriculture, Forestry and Fishing) funding (\$720,000), generous funding from the University of Nebraska Medical Center’s Vice Chancellor for Research (\$540,000), the University of Nebraska Lincoln (UNL) College of Agricultural Engineering (\$20,000), and the UNL Institute of Agriculture and Natural Resources (\$40,000) has allowed **CS-CASH to fund 71 pilot projects over 12 years**. Additional funding received by Pilot Program investigators due to data generated through their pilot research amounts to \$21,782,827.

Grant Year	# of Pilot Projects	Peer Reviewed Articles	Presentations Oral / Poster	**Non-Peer Reviewed Articles	***Other Products	Initial Funding	****Additional Funding
Y1	5	0	20	2	8	\$95,000	\$1,319,581
Y2	7	1	25	15	3	\$100,000	\$1,275,712
Y3	5	1	3	4	1	\$60,780	\$15,000
Y4	4	9	25	15	7	\$100,000	\$3,135,208
Y5	5	4	5	7	5	\$100,000	\$1,270,000
Y6	7	6	12	2	8	\$140,000	\$1,853,484
Y7	7	5	4	7	2	\$140,000	\$120,000
Y8	5	7	13	3	22	\$100,000	0
Y9	7	6	8	0	24	\$138,742	\$3,149,499
Y10	8	5	9	12	6	\$140,000	\$9,518,731
Y11	5	4	10	4	14	\$100,000	\$125,612
Y12	6	NA	3	1	10	\$120,000	0
<b>TOTAL</b>	<b>71</b>	<b>48</b>	<b>137</b>	<b>72</b>	<b>110</b>	<b>\$1,334,522</b>	<b>\$21,782,827</b>

\*Education / Training includes course/curriculum, material distribution, mtg./conference, training/demonstration, workshop

\*\*Non-Peer Reviewed Articles include reports, booklet/brochure, factsheet, interview (media/other), newsletter, multimedia, websites

\*\*\*Other Products include reports, focus group, evaluation instrument/tool, questionnaire/survey/checklist, site visit, farm safety audit, consultations, testing and screenings

\*\*\*\*Additional Funding includes all grant years including indirect costs.

## Return on Investment

A return on investment of 1,632% is calculated from subsequent agricultural safety and health funding received by Pilot/Feasibility Program recipients.

## Evaluation of Pilot and Feasibility Projects

In addition to evaluation plans built into individual project proposals, the CS-CASH evaluation team also assesses each project's progress, outcomes, and outputs. Evaluations are shared with the grantees and Dr. Eleanor Rogan, Pilot Program investigator.

## Resource Sharing

CS-CASH provides a range of no-cost resources to investigators from the inception of their project to completion. Resources include expert analytical assistance from Dr. Cheryl Beseler and the UNMC (University of Nebraska Medical Center) Center for Collaboration on Research Design and Analysis (CCORDA) and content expertise provided by CS-CASH researchers and administration. Grant recipients are invited to attend and present at the monthly CS-CASH member meetings and are forwarded all information about grant opportunities, webinars, conferences, and other information that could assist the investigators with their research.

## Funded Regions

Since 2011, CS-CASH has funded 71 Pilot Projects in all 7 of the States served by the Center and several National projects. Recipients include community organizations, health departments, post-doctoral students, scientific researchers, and ag safety and health organizations.

## Impact

Pilot Project data have been used to generate more significant awards totaling \$21,782,827, have resulted in 48 peer-reviewed manuscripts and many other valuable outputs.

## Notable Awards Received in the 2022-2023 Year:

- Grant Title: Resolving Occupational Exposure-Induced Lung Disease  
Funding Agency: DHHS/CDC/NIOSH #1R01OH012045  
Award: \$1,478,353 (direct costs); \$788,679 (indirect costs)  
Principal Investigator: Jill A. Poole, MD
- Grant Title: Development of a social marketing intervention to improve screening rates for colorectal cancer among agricultural operators.  
Funding Agency: University of Nebraska Collaboration Initiative  
Award \$125,612  
Principal Investigator: Shinobu Watanabe-Galloway

### Pre-Submission Assistance

- Evaluation plan
- Data analysis plan
- Design of survey instruments
- Project review by content experts

### Project Period Assistance

- 7-States farmer and rancher database available to project team
- Networking during monthly CS-CASH Member Meeting
- Referrals to stakeholders
- Notifications regarding additional funding opportunities

### Post-project Assistance

- Manuscript assistance
  - Technical and financial
    - Data analysis
    - Evaluation
- Notifications regarding additional funding and collaborative opportunities

## 2022-2023 Pilot Projects

Find more information about each project in the following pages.

### **Final Reports**

#### **Evidence-Based Training for Employees Exposed to Hazards Associated with the Storage, Handling, Transport, and Processing of Agricultural Wastes**

Mahmoud Nour, PhD

#### **The Ability of Adult Female Operators to Reach Agricultural All-Terrain Vehicle Controls**

Farzaneh Khorsandi, PhD, & Fadi Fathallah, PhD

#### **Development of CRC Screening Education Material for Agricultural Workers**

Shinobu Watanabe-Galloway, PhD

### **Ongoing Projects**

#### **Identification of Strengths and Limitations of Current Risk Assessment and Hazard Analysis Methods when Used to Improve the Safety of Automated Agricultural Machineries**

Roger Aby

#### **Surveillance of Needs, Wants, and Perception of Agriculture Health and Safety Programs in Kansas**

Edwin Brokesh, PhD, & Cheryl R.Boyer, PhD

#### **Investigating New Technologies for Heat Stress Mitigation in Agriculture**

Ryan Cannady, MS, MBA, CIH, CSP, STS-C

#### **The Classroom Component: A Hands-On Experience of Agricultural Safety and Health Education Aimed at Children Attending Rural Elementary Schools**

Jana Davidson

#### **Focus Group Study of Iowa Farming Parents on their Attitudes Regarding Firearm Storage in Homes and Firearm Injury Prevention Efforts**

Marc Doobay, MPAS PA-C

#### **Understanding Perceptions of Tick-Borne Disease Risk and Prevention in Agricultural Operators and their Healthcare Providers in the Plains States\***

Joseph Fauver, PhD, & Juliana Monono, MPH

#### **Exposure to Zoonotic Diseases in Agricultural Workers of the Great Plains: An Evaluation of Real and Perceived Risk and Mitigation Behaviors in Rural Agricultural Workers of the Great Plains**

Mystera Samuelson, PhD

#### **Examining Factors Influencing Respiratory Protection Usage among Young Adult Pork Producers and Enhancing Respiratory Protection Resources for Females Working in Agriculture\***

Carolyn Sheridan, RN, BSN, & Jenna Gibbs, PhD

#### **Targeting Immunometabolic Pathways of Lung Myeloid Cells to Reduce Agricultural Exposure-Induced Lung Disease**

Aaron Schwab

#### **Factors Associated with Severe Livestock Work-Related Injuries**

Ruth Woiwode, PhD, & Elliot Dennis, PhD

#### **\*Emerging Issues Grants**

The Emerging Issues program funds small grants (\$30,000 allocated annually) addressing emerging issues related to agricultural worker safety and health. Proposals can be submitted at any time using the Center's pilot projects proposal form. The Center Director and the Pilot Projects Program team evaluate the proposals and issue expedited funding decisions. The emerging issues grants have a maximum amount of \$20,000, for a duration of 18-months.



# Evidence-Based Training for Employees Exposed to Hazards Associated with the Storage, Handling, Transport, and Processing of Agricultural Wastes

Mahmoud Nour, PhD

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## Project Aims

1. Utilize the data currently available in the Purdue University Agricultural Confined Space Database ([agconfinedspaces.org](https://agconfinedspaces.org)) to identify and prioritize primary causative factors to develop an evidence-based educational curriculum.
  2. Update and enhance the curriculum resources developed by Purdue University as part of an earlier Susan Harwood Training Grant (2012-2015) that targeted: 1) emergency responders; and 2) young and beginning workers in the grain industry and incorporating resources relevant to manure storage and handling issues.
  3. Update and enhance the Purdue managed website ([agconfinedspaces.org](https://agconfinedspaces.org)) to reflect new findings and the new instructional content developed on worker hazards related to agricultural wastes. Completed instructional content will be added, resources updated, frequently asked questions expanded, and references updated.
  4. Utilize the new instructional content related to safe storage and handling of agricultural wastes, conduct training for no fewer than 10 trainers in the Central States Region who work in settings where they can conduct training on hazards associated with agricultural wastes.
- 

## Accomplishments

A panel of experts in the field of agricultural confined spaces was used to prioritize causative factors and identify primary learning and training outcomes for an evidence-based educational curriculum.

Revisions to existing curriculum resources developed by Purdue University that target emergency responders and young and beginning workers in the grain industry included:

- Recent findings from research in the field of agricultural confined spaces.
- Content related to the hazards associated with storage, handling, transport, and processing of agricultural wastes on large agricultural production operations.
- Feedback from participant evaluation of prior trainings.

A PowerPoint presentation entitled *Production Agriculture Safety Training for Employees Exposed to Hazards Associated with Storage, Handling, Transport, and Processing of Agricultural Wastes* was created based off our findings, and the [2021](#) and [2022](#) *Summary of U.S. Agricultural Confined Space-Related Injuries and Fatalities* were published to the Purdue University website

- Visit: [purdue.edu/engineering/ABE/agconfinespaces/injury-fatality-reports](https://purdue.edu/engineering/ABE/agconfinespaces/injury-fatality-reports)

We shared this information with our target audience in the following ways:

- Classroom instruction to more than 147 students over the 2022-2023 academic year at Purdue University.
- Sharing of presentation material to agricultural safety websites.
- Presentation to more than 150 emergency first responders and ag workers, and more than 100 licensed manure transport operators from multiple states.

## **Presentations**

- Secondary Victims Associated with Incidents Involving Ag Confined Spaces, ISASH Meeting, Tampa, FL. June 2023
- Summary of Bunker Silo-Related Injuries & Fatalities with Recommended Evidence-Based Safety Measures, ASABE International Meeting, Omaha, NE, July 2023
- Poster presentation from 2022 North American Manure Expo



# The Ability of Adult Female Operators to Reach Agricultural All-Terrain Vehicle Controls

Farzaneh Khorsandi, PhD, & Fadi Fathallah, PhD

## Project Aims:

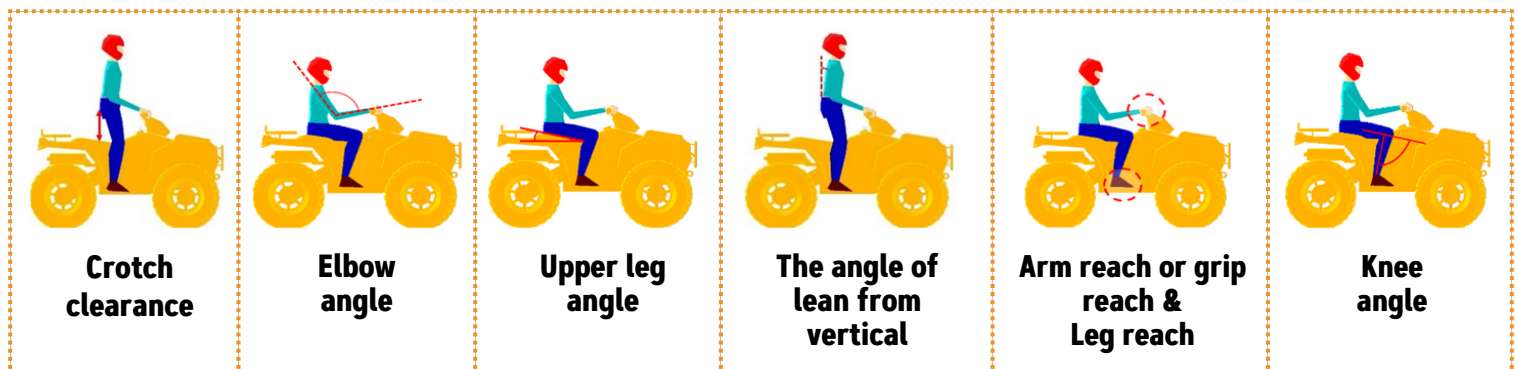
1. Identify potential anthropometric discrepancies between the requirements for operating utility ATVs and the physical characteristics of women of varying ages and percentiles.

## Project Background

We hypothesize that the significant differences in females' anthropometry and strength compared to males pose severe limitations to their safe and comfortable operation of utility ATVs. This hypothesis was formulated based on the results of previous studies that demonstrated that small individuals have severe limitations related to the safe operation of utility ATVs due to constraints in their physical capabilities to reach and activate ATV controls. In order to test this hypothesis, we evaluated if females of varying age groups (young adults, middle-aged adults, and elderly) and height percentiles (5th, 50th, and 95th) are able to reach the controls of utility ATVs through actual field measurements and virtual simulations. We also performed the same analysis with male subjects to establish a baseline for comparison.

Rider-ATV fit was analyzed through virtual simulations and was carried out in four steps. First, we identified seven guidelines for the fit of riders and ATVs based on recommendations from ATV safety advocacy organizations. The second step consisted of identifying a database containing anthropometric measures of riders of various age groups, genders, and height percentiles. The third step consisted of collecting the dimensions of five utility ATV models to create a three-dimensional (3-D) representation of them. The fourth step consisted of using SAMMIE CAD (SAMMIE CAD Inc., Leics., UK) to evaluate if the rider's anthropometric measures conform to the guidelines identified in step one.

## Identified ATV-Rider Fit Criteria



## Findings

Findings of individual reach criteria for the subjects are presented below. The last column of the table (Total) represents the percent of observations for which riders scored 7 points (i.e., they fulfilled the requirements of all seven fit guidelines). Criterion 2 and 7 (elbow angle and knee angle), respectively) seemed difficult for female subjects. In addition, female operators failed to pass one or more safety recommendations for at least 40% of the ATVs evaluated in this pilot study. The results were even more striking for senior female operators since they only passed all safety recommendations for 20% of the assessed vehicles.

### Percent of observations (n=5) for which reach criteria did not limit ATV use by operators of various age groups, genders, and percentiles.

Gender	Subject	Criterion 1	Criterion 2	Criterion 3	Criterion 4	Criterion 5	Criterion 6	Criterion 7	Total
Females	YA (5th)	100	60	60	100	100	60	60	40
	YA (50th)	100	60	80	100	100	80	80	60
	YA (95th)	100	60	80	100	100	80	80	60
	MA (5th)	100	60	80	100	100	80	80	60
	MA (50th)	100	60	80	100	100	80	80	60
	MA (95th)	100	60	80	100	100	80	80	60
	E (5th)	100	60	60	100	100	60	60	60
	E (50th)	100	100	60	100	100	60	60	60
	E (95th)	100	60	60	100	100	60	60	20
Males	YA (5th)	100	60	80	100	100	80	80	60
	YA (50th)	100	80	80	100	100	80	80	60
	YA (95th)	100	60	100	100	100	100	100	60
	MA (5th)	100	80	80	100	100	80	80	60
	MA (50th)	100	80	80	100	100	80	80	60
	MA (95th)	100	40	100	100	100	100	100	40
	E (5th)	100	80	80	100	100	80	80	60
	E (50th)	100	80	80	100	100	80	80	60
	E (95th)	100	40	100	100	100	100	100	40

YA: Young adults; MA: Middle-aged adults; E: Elderly



A comparison between the results of female and male operators (females minus males) is presented below. It is clear that female operators have limitations relative to their male counterparts. On average, female operators are 7% less likely to be physically able to operate an adult-sized ATV.

**Comparison between the results of female and male operators (percent of ATVs without limitations for female operators minus percent of ATVs without limitations for male operators)**

Subject	Criterion 1	Criterion 2	Criterion 3	Criterion 4	Criterion 5	Criterion 6	Criterion 7	Total
YA (5th)	0	0	-20	0	0	-20	-20	-20
YA (50th)	0	-20	0	0	0	0	0	0
YA (95th)	0	0	-20	0	0	-20	-20	0
MA (5th)	0	-20	0	0	0	0	0	0
MA (50th)	0	-20	0	0	0	0	0	0
MA (95th)	0	20	-20	0	0	-20	-20	20
E (5th)	0	-20	-20	0	0	-20	-20	0
E (50th)	0	20	-20	0	0	-20	-20	0
E (95th)	0	20	-40	0	0	-40	-40	-20

**Conclusions**

The results of this preliminary study suggest that females’ anthropometry poses severe limitations to their safe and comfortable operation of utility ATVs. Therefore, we recommend conducting a comprehensive study with a reasonably representative sample size to confirm our hypothesis. In addition, based on the results of a previous report 10, it seems like females’ physical strength is significantly less than the physical strength of their male counterparts. As such, there is a need for a study to evaluate if females’ physical strength is sufficient to activate the controls of utility ATVs.

**Next Steps**

- We plan on expanding this research into developing a full-length research manuscript and submitting it for publication in a peer-review journal.
- We plan on presenting highlights of this research at professional conferences.
- We plan on developing comprehensive guidelines related to ATV-rider fit based on their physical capabilities.
- We are going to submit another proposal titled “Forces Required to Operate Controls on Agricultural All-Terrain Vehicles: Implications for adult female Operators” to evaluate the physical capabilities of women riding utility ATVs.

# Development of Colorectal Cancer (CRC) Screening Education Material for Agricultural Workers

Shinobu Watanabe-Galloway, PhD

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## Project Aims

1. Conduct focus groups of agricultural workers to obtain input about the content and delivery mode of the CRC screening educational material.
  2. Develop education material aimed to increase CRC screening among agricultural workers using data from focus groups.
- 

## Accomplishments

Two focus groups, consisting of Nebraskan agricultural operators over 45 years of age, were conducted in-person at a facility familiar to agricultural operators. These 60-minute sessions contained a set of semi-structured questions, and a \$50 gift card upon completion. The two groups were divided by gender, including the facilitators, but only the female group was comfortable being recorded. The female focus group transcript was used verbatim, while the male focus group data was analyzed using the facilitator's notes.

Structured around a concept mapping model, the focus group questions included prompts to capture individual characteristics, cultural variables, health beliefs and health behaviors; the inclusion of health beliefs and behaviors is essential to understanding the participants' attitudes, prior knowledge, and barriers or facilitators toward CRC and CRC screening. Statements in response to these prompts were written on a board, discussed, and sorted as a group. The female focus group proceeded to individually rank each statement on a five-point Likert-type scale, while the male focus group opted to sort the statements into barriers or facilitators of CRC screening. For the female group, these ratings were used to create a similarity matrix to visualize agreement on CRC beliefs and turned into a cluster graph. The male focus group statements were visualized as a dendrogram, with K-means clustering of different themes.

## Outcomes

The clusters of statements from both focus groups helped highlight similar values, but with some differences of priority between the groups. The women were more interested in financial barriers, education, and procedural symptoms of CRC screening, but both groups stressed the importance of social support. Men were more concerned about positive results and personal embarrassment, and had preference for a colonoscopy where they did not know the provider; this can be a challenge in small rural communities. Both groups stated that a family or personal history of cancer affected their decision to get screened, but there was a general consensus that awareness of CRC and CRC screening was low.

## Significance

Rural agricultural operators' priorities in our study tend to align with other CRC screening research on rural communities, including some cross-cultural gender similarities. However, when compared with other rural CRC studies, agricultural operators had higher emphasis on social support and cancer history, which may be more effective channels for educational CRC screening interventions. The concept mapping structure used in this study also helps promote group cohesion and spontaneous discussion, and the Likert-style ratings are insightful for clustering group statements into distinct themes. The visualization of these statements helps pinpoint the most effective educational channels, which is essential to reducing CRC incidence rates and increasing CRC screening.

Facilitators to CRC screening in our focus groups included encouragement from friends, family, or healthcare providers, or having a personal or family history of cancer; barriers included cost, embarrassment, awareness, and discomfort. Educational materials about CRC screening for agricultural operators should be targeted toward these cluster themes, but priority differences between the genders must be taken into account during the development and delivery of learning materials. This theory-driven, mixed-methods approach is the first of its kind to focus on rural agricultural operators' perceptions of CRC screening, and provides critical insight to designing a culturally tailored intervention for this population.

## Publications

Beseler C, Kim J, Subramanian R, Harris S, Funkenbusch K, Yoder AM, Robinson T, Foster JM, **Watanabe-Galloway S**. Exploring barriers and promoters of CRC screening use among agricultural operators: A Pilot Study of an Application of Concept Mapping. *Rural and Remote Health*. (In Press).

## Funding Resulting from this Work

University of Nebraska Collaboration Initiative (\$125,612): Development of a social marketing intervention to improve screening rates for colorectal cancer among agricultural operators.



# Identification of Strengths and Limitations of Current Risk Assessment and Hazard Analysis Methods when Used to Improve the Safety of Automated Agricultural Machineries

Roger Aby

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## Project Aims

1. Determine the frequency that engineers use different risk assessment and hazard analysis methods when dealing with automated agricultural machinery
2. Investigate and analyze the strengths and weaknesses of current risk assessment and hazard analysis techniques.
3. Examine perceptions of potential obstacles and drivers of the adoption of automated agricultural machines.

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## Significance

This project will:

- Find reasons why industry professionals no longer feel confident using these risk analysis methods,
- Reveal the specific weaknesses and strengths of these methods, and
- Help engineers modify and/or design well-suited and efficient risk assessment analysis tools for agricultural automated machinery, with the goal of decreasing safety concerns and barriers to adopting advances in automated technology.

## Accomplishments

The American Society of Agricultural and Biological Engineers (ASABE) committee name titles were used to determine possible survey participants. Each committee contains several members. A total of 252 committee names were identified and examined. Only the committees that are likely to include a scope and activities relevant to automated agricultural machinery were included. Committee title names with one or a combination of the following keywords were extracted: Ergonomics; Safety; Health; Machine; Robotics; Mechatronics; Instrumentation; Machinery; Transport; Tractors; Electronics; ROPS; Equipment; Automation; Aerial; Precision. Overall, 31 committee title names were obtained with 1,746 members. Members' names, positions held, organizations to which they belong, and email addresses were exported to a Microsoft Excel file. Duplicate names from people serving on several committees were deleted. As a result, 711 members were obtained and considered in this study.

IRB approval was received, and a panel of experts was convened to improve the quality of the questionnaires. The survey started the first week of July and remains open. So far, we have received 137 responses. The next step is to analyze the data, write a paper, and publish it to the Safety MDPI Journal.



# Surveillance of Needs, Wants, and Perception of Agriculture Health and Safety Programs in Kansas

Edwin Brokesh, PhD, & Cheryl R. Boyer, PhD

## Project Aims

1. We will gather information through surveys of Kansans on their needs, wants, and perception of agriculture safety and health programming in the state.
2. We will use the data gathered to determine the next steps in developing an agriculture safety and health program throughout the state.

## Significance

This feasibility study aims to gather information through online surveys of Kansans on their needs, wants, and perception of agriculture safety and health programming in the state. The data gathered will determine the next steps in developing an agriculture safety and health program throughout the state.

Based on the findings, the leadership team plans to seek additional funding for education programming, outreach, and research to reduce the risk of work-related illnesses and injuries in the agricultural sector, including those in vulnerable worker populations.



## Accomplishments

Partners to assist in distributing the survey include K-State Research and Extension (KSRE) agents throughout the state, KSRE Communications in the way of news releases, Native American tribal liaisons, the Kansas Community Health Worker Coalition, Kansas commodity member groups, ag business, and other supporters of agriculture and producers in our state.

The survey is currently in draft form and is planned for distribution in November 2023. We anticipate receiving 500 surveys to analyze using Qualtrics, participants are incentivized by a pair of KSRE gloves that will be mailed to them through blind data collection. The survey answers will be kept confidential to the extent that responses will not be tied to a name and the name will not appear in the results or reporting.



### LEARN MORE ABOUT THIS WORK

Visit <https://www.k-state.edu/kash/research/research.html>

Or use your smartphone to scan the QR code.



# Investigating New Technologies for Heat Stress Mitigation in Agriculture

Ryan Cannady, MS, MBA, CIH, CSP, STS-C

## Project Aims

We will perform a mixed-methods approach to assess the overall effectiveness of the wearable technology.

- 1. We will use quantitative analyses to investigate the effectiveness of the new technology used to mitigate heat-related illnesses within the poultry industry.**
- 2. We will use cost-benefit analysis methods to investigate the financial benefits of new heat stress technologies.**
- 3. We will use qualitative methods to investigate the workers; preceptions on the heat stress technologies.**

## Significance

Historical heat-stress controls use devices that evaluate environmental conditions such as temperature, wind speed, radiant heat, and relative humidity. These metrics produce a calculated measure that drives work allocation for employees. The standard control evaluates the environmental conditions to control the entire workforce. The challenge with this approach is that individuals respond differently in environments. The associated worker may be unacclimated to heat, taking specific medications, differs in age, or dehydrated; all which influence response to heat. Based on these personal factors, choosing a one-size-fits-all approach with historical controls may not be sufficient for total worker health.

New trends have developed with wearable technology to assess heat stress risk. Wearable technology has been implemented in industrial settings to evaluate core body temperature and heart rate during work activities. These metrics assess how the individual responds to the environmental conditions in their daily tasks. With the introduction of evolving technologies, the need to assess the feasibility of the technology deployment and employees' perspectives is necessary.

## Accomplishments

Data collection is currently ongoing. The data collection consists of six participants that support the operations including an electrician, two carpenters, a heavy equipment operator, a landscaper, and calf production operations. The quantitative analyses will evaluate physiological response during active environmental monitoring. The analyses will seek to understand how the employees interact with their environmental conditions. After the end of the data collection period, the employees will participate in a focus group to discuss heat-stress awareness and overall perspectives of the wearable technologies. Thematic analyses will be used to extrapolate key findings and perceived opinions of the devices.

## Next Steps

This pilot project will provide important preliminary data for a larger study focused on implementation across other occupations (e.g., municipal workers, powerline workers/linemen, construction) and other groups at high-risk of heat-related illness (e.g., elderly, children, youth participating in sports). This project will seek dissemination through scholarly publications and presentations and will look for future funding opportunities to expand preliminary findings.

# **The Classroom Component: A Hands-On Experience of Agricultural Safety and Health Education Aimed at Children Attending Rural Elementary Schools**

Jana Davidson

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## **Project Aims**

**The Classroom Component project will aim at making the adoption of a Progressive Agriculture Safety Day® program more accessible and appealing to elementary schools. The Classroom Component will:**

1. Provide a hands-on, educational learning experience for elementary school students in grades Kindergarten – 6th grade.
  2. Provide volunteers, known as Key Facilitators, with training offered on-line and at their own pace in the PAF Training Center, to better understand how to present to elementary-aged students, how to utilize resources provided, and how to locate additional materials.
  3. Provide each Key Facilitator with a resource kit containing materials needed to offer hands-on activities and tabletop demonstrations.
  4. Provide a Marketing & Communications Toolkit for each Key Facilitator including an introduction letter to schools, promotional flyer, press release templates, student certificate of completion, and a class poster.
  5. Provide a Curriculum Toolkit for each Key Facilitator with lesson plans, demonstrations, hands-on activities, videos, and “how to” guides for building, assembling, or locating props.
  6. Provide a Reporting and Evaluation Toolkit for each Key Facilitator to measure the effectiveness of the project. The toolkit will include a reporting database and evaluation assessments for Key Facilitators, Teachers/Observers, Students, and Parents
  7. Provide a Support Toolkit for each Key Facilitator with Progressive Agriculture Foundation staff contact information and answers to Frequently Asked Questions. Additionally, we will offer year-round support through open-calls and office hours for Key Facilitators.
  8. Create a Peer-to-Peer Engagement Module and an opportunity for high school students & teens to get involved and develop life skills, with guidance from a caring adult mentor.
  9. Engage new audiences by marketing the Classroom Component at various conference and conventions featuring both ag and non-ag educators, as well as farm shows and other events.
  10. Establish a cost structure to help sustain the Classroom Component long-term by identifying ways to fulfill, distribute, and warehouse the resource kits, a database to store Key Facilitators information/reporting, and the addition of staff support/intern to maintain and grow program.
-

# Focus Group Study of Iowa Farming Parents on their Attitudes Regarding Firearm Storage in Homes and Firearm Injury Prevention Efforts

Marc F. Doobay, MPAS PA-C

## Project Aims

- 1. We will identify current practices, attitudes, and perceptions of firearm and ammunition storage in the homes of parents of adolescents in rural farming/ranching families.**
- 2. We will determine how parents of adolescents in rural farming/ranching families feel about current programs and proposed legislation to improve firearm storage.**
- 3. We will ascertain what parents of adolescents in rural farming/ranching families believe would be the most effective programming and messaging to improve safe storage practices of firearms and ammunition.**

## Significance

Firearm-related injuries are the leading cause of child and adolescent death in the United States. Rural areas, in particular, have higher rates of firearm-related unintentional and suicide deaths. A survey study of 1,400 adolescents at the 2019 Iowa FFA Leadership Conference revealed over 85% lived in a home with a firearm, many of whom reported unsafe storage of firearms and ammunition. We plan to conduct eight exploratory Focus Group sessions with parents of adolescent FFA members in rural Iowa farming communities. These sessions will be used to understand better rural families' current practices and attitudes regarding firearm and ammunition storage, what practices they would be willing to change to increase safety and prevent injury, and what messaging and safety programming they think would be most effective in educating rural families to improve storage practices and help decrease firearm-related deaths and injuries among adolescents in farming/ranching communities.





# Understanding Perceptions of Tick-Borne Disease Risk and Prevention in Agricultural Operators and their Healthcare Providers in the Plains States

Joseph Fauver, PhD, & Juliana Monono, MPH

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## Project Aims

1. Develop and deploy a questionnaire to understand agricultural operators' perceptions of tick-borne disease risk and prevention.
  2. Adapt and expand an existing questionnaire aimed at understanding healthcare provider and veterinary practitioner knowledge of tick-borne diseases to additional plains states.
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## Significance

Tick-borne diseases (TBDs) represent an emerging threat in the great plains region served by CS-CASH. This study represents the first comprehensive assessment of agricultural operators, health care providers, and veterinary workers knowledge, attitudes, and perceptions of TBDs in our region.

## Accomplishments

Three unique surveys have been designed for agricultural operators, healthcare providers, and veterinary practitioners. Questionnaires have been designed to assess participants:

- Knowledge of ticks, including where people encounter ticks
- Knowledge of TBD, including how they are transmitted and which TBD they may be exposed to in their area
- Preferences for receiving information regarding ticks and TBD
- Relevant demographic information

For agricultural operators specifically, we have designed the survey to assess:

- Their perception on occupational exposures to ticks and TBD
- Their current tick bite prevention practices and willingness to take precautions to reduce tick bites
- Their history of exposures to tick-bites.

The healthcare and veterinary workers survey was adapted from a previous survey of healthcare providers in Nebraska. For healthcare providers, we have included questions to assess:

- Their knowledge of symptoms of and evidence-based treatments for various TBDs and Alpha-Gal syndrome
- Whether they have sought diagnostic testing and treatment options for TBDs
- Whether they provide their patients with information on tick bite prevention

In the veterinary survey the questions were adapted for ticks and TBD that impact animals in the plain's states.



All surveys were designed using Qualtrics and consist of questions with binary yes/no, check all that apply, and Likert-scale formats. The survey design process began in January 2023 after conducting the background analysis and literature review regarding ticks and TBD in the study catchment area.

After the initial survey was developed it went through numerous editing phases with our collaborators at the UNL Bureau of Sociological Research (BOSR) who are helping us distribute and coordinate the data collection for the healthcare and veterinary workers. The questionnaires have been reviewed extensively by our collaborators at the UNL BOSR and CS-CASH.

Initial surveys for healthcare providers and veterinary workers have been distributed, and agricultural operator surveys will be distributed in Fall 2023.





# **Exposure to Zoonotic Diseases in Agricultural Workers of the Great Plains: An Evaluation of Real and Perceived Risk and Mitigation Behaviors in Rural Agricultural Workers of the Great Plains**

Mystera Samuelson, PhD

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## **Project Aims**

- 1. Determine which vertebrate vector species are of highest concern to agricultural workers in the Central States and describe the behavioral, biological, and ecological indicators used by workers to determine risk.**
  - 2. Assess and describe the risk mitigation strategies employed by agricultural workers, and identify the potential safety risks associated with such interventions.**
- 

## **Significance**

The aim of this study is to assess the real and perceived threats for the exposure to zoonotic diseases by agricultural workers, as well as the mitigation procedures they currently institute to protect themselves, their staff, their livestock, and their companion animals. Through identifying the level of perceived risk, as well as current mitigation measures in process, it will become possible to develop and implement scientifically validated applied mitigation techniques and procedures for use in agricultural settings throughout the Great Plains.

## **Accomplishments**

We have collected surveys from Nebraska agricultural workers using the Dillman Mixed Method, involving both mail-out questionnaires and corresponding online questionnaires administered by Qualtrics. We received 63 responses, including 8 subjects who were willing to be interviewed over the phone to discuss their perception of zoonotic disease, exposure risk, risk mitigation methods, and past injuries relating both to animal exposures as well as accidents occurring while implementing these mitigation strategies.

Subjects ranged in age from 30-80 years of age and were located across the state of Nebraska. Most of our respondents were male (76.3%), between the ages of 60-79 years of age and identified as white (90.3%). At present, we are preparing a manuscript detailing the responses we have received in these surveys, comparing these results to the statewide trends in reported occurrence of zoonotic diseases as well as documented injuries resulting from mitigation efforts. We hope to submit a manuscript in fall of 2023.

# Examining Factors Influencing Respiratory Protection Usage Among Young Adult Pork Producers and Enhancing Respiratory Protection Resources for Females Working in Agriculture

Carolyn Sheridan, RN, BSN, & Jenna Gibbs, PhD

## Project Aims

1. Apply advanced statistical methods to a dataset of 700 young adults engaged in hog production to examine factors influencing reported respiratory protection use.
2. Develop a one-page respiratory protection “fact sheet” for females in agriculture and to disseminate it among all genders at Gear Up for Ag™ programs in the Midwestern U.S.
3. Deliver a Gear Up for Ag Health and Safety Program™ at two collegiate agriculture programs in Nebraska to pilot test dissemination of the new fact sheet and emphasize respiratory protection.

## Accomplishments

The results of our statistical analysis of 700 young adults engaged in hog production were published in the American Journal of Industrial Medicine in July 2023. The findings from these studies were also reported at the International Society for Agricultural Safety and Health (ISASH) 2023 annual conference in Tampa, Florida. The Ag Health & Safety Alliance (AHSA) promoted the article on social media platforms, including Facebook and LinkedIn.

The one page respiratory protection “fact sheet” for females in agriculture is in progress, with the illustrator currently adding photos that depict female faces and shapes with different types of respirators. Following an extensive review by AHSA and CS-CASH, the illustrator is also doing final edits to content and design work.

The Gear Up for Ag Health and Safety Program™, with the new fact sheet, will be presented in classes at the University of Nebraska Lincoln.

The following outreach materials were produced:

- *Protecting Your Lungs is Important for Everyone.* Illustrative poster on respirator protection in agricultural production. 2023. Ag Health and Safety Alliance™, developed in conjunction with Scott Mooney (illustrator) and CS-CASH.
- *Respirator Fit is Important- What size are you?* Illustrative poster on respirator use in agricultural production. 2023. Ag Health and Safety Alliance™, developed in conjunction with Scott Mooney (illustrator) and CS-CASH.



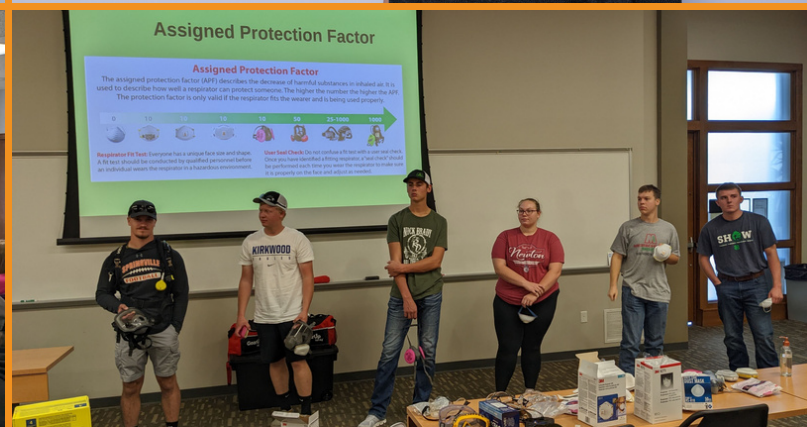


## Publications & Presentations

**Gibbs JL, Sheridan CE, Yoder A, Beseler C, Rautiainen R. (2023).** Self-reported quad bike use, safety behaviors, and safety awareness among young adults in U.S. and Canadian agriculture. *Journal of Agromedicine*, 28(1):18-27. doi.org/10.1080/1059924X.2022.2141408 PMID: 36302736

Gibbs JL, Sheridan C, Sullivan D, Rautiainen R, Nonnenmann MW, Wyatt TA. *Gender-specific difference in reported respiratory protection behaviors of young adult hog producers.* Oral Presentation. International Society of Agricultural Health and Safety Conference. June 2023. Tampa, FL.

Gibbs JL, Sheridan C, Duysen, E, Nonnenmann M. Submitted to Midwestern Rural and Agricultural Safety and Health (MRASH) Conference, Davenport, IA. 2023.



# Targeting Immunometabolic Pathways of Lung Myeloid Cells to Reduce Agricultural Exposure-Induced Lung Disease

Aaron D. Schwab

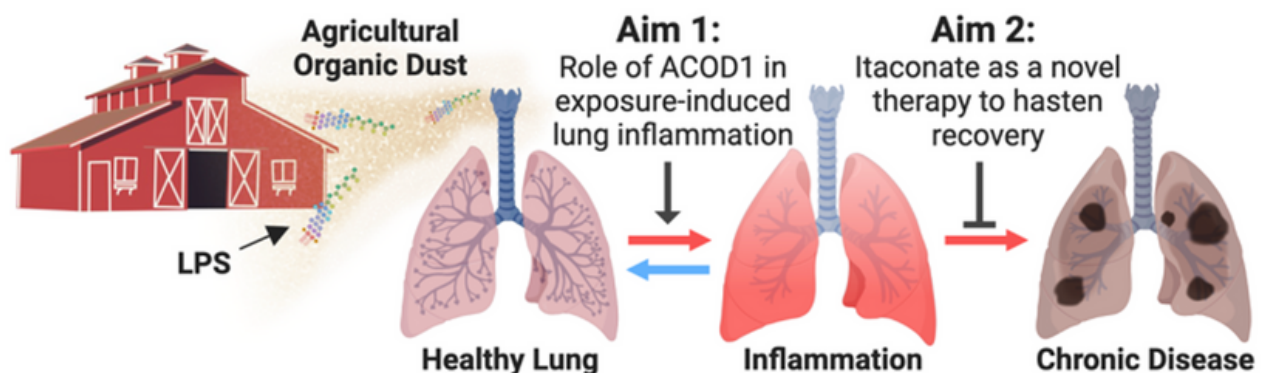
## Project Aims

1. **Delineate the role of the ACOD1 pathway in mediating the lung inflammatory response and resolution processes following inhalant agriculture-derived exposures.**

We hypothesize that the activation of the ACOD1/itaconate pathway following inhaled, agriculturally derived exposures forms a negative feedback loop to dampen the airway inflammatory response and ultimately hasten lung recovery and resolution.

2. **Determine whether lung-delivered itaconate serves as a novel therapeutic approach in promoting resolution of acute and repeated inhalant agriculture-derived exposures.**

We hypothesize that lung-targeted delivery of the ACOD1 pathway product, itaconate, promotes resolution of airway inflammation following acute and repetitive exposure(s) to agricultural inflammatory agents through its action on monocytes/macrophages.



## Significance

Our central hypothesis is that the ACOD1-itaconate immunometabolic pathway can be exploited to develop novel approaches to speed up lung recovery, reducing disease development following agricultural exposures. Our early studies appear to be confirming this hypothesis. This is significant because knowledge of how agricultural lung disease could be immunometabolically regulated has not been previously investigated. Not only does this research further demonstrate the role of the ACOD1-itaconate pathway in facilitating inflammatory responses in the lung with focus on agricultural exposures, but it also aims to demonstrate the therapeutic capacity of a bioactive metabolite with broad anti-inflammatory potential.



## Research Methods

Wild-type and aconitate decarboxylase 1 knock out (ACOD1 KO) mice will be intratracheally exposed once to lipopolysaccharide (LPS), organic dust extract (ODE), or saline. Animals will be euthanized 2- and 7-days post-exposure with lung histopathology, cell subpopulation characteristics, inflammatory mediators, and pro-fibrosis indices assessed. Separate experiments will conduct airway hyper-responsiveness assessments 3-5 hours post-instillation of occupational inflammatory agents. The therapeutic potential of itaconate in reducing agricultural exposure associated lung disease will also be explored. Mice will be treated intratracheally with itaconate 5-hours after the final LPS or ODE exposure then daily for 2 or 7 days. Following the acute (one-time exposure) modeling studies, we will also explore the role of itaconate therapy in the setting of repetitive exposure modeling whereby mice will be exposed daily to LPS or ODE for one week. Correspondingly, the same experimental endpoints described for acute exposure modeling will be undertaken.

## Data Collection

We have already made significant progress in data collection for Aim 1. Namely, we have conducted several exposure experiments for both LPS and ODE in male and female wild-type and ACOD1 KO mice (N=8 mice/group from at least 2 independent experimental runs). We are in the process of completing the characterization of the lung inflammatory response to the acute exposure condition with lung histology, flow cytometry, and inflammatory mediator data being analyzed. We have also initiated experiments for the airway hyper-responsiveness experiments using the Buxco FinePointe interrogation system. Preliminary in vitro experiments aimed at investigating the influence of itaconate on monocyte-derived macrophage differentiation and phenotype are occurring prior to undertaking the experiments detailed in Aim 2.

## Outcomes

Our very preliminary findings are demonstrating that the immunometabolic pathway regulated by ACOD1 plays a significant role in facilitating the lung inflammatory response to occupational exposures. Data are suggesting that ACOD1 KO mice demonstrate reduced lung cell infiltrates (neutrophils, transitioning monocyte-macrophage subpopulations) with reduction in pro-inflammatory mediators that comprise the inflammatory microenvironment of the lung 48-hours after an acute LPS and ODE exposure.



# Factors Associated with Severe Livestock Work-Related Injuries

Ruth Woiwode, PhD, & Elliot Dennis, PhD

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## Project Aims

1. We aim to identify and quantify the primary drivers of animal work-related injuries in the United States.
2. We will examine how drivers vary by the severity of the injury, across time, location, type of livestock operation, and other relevant covariates.

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## Significance

Animal worker skill level is not currently well understood or defined and is a contributing factor to livestock-related injuries. By initially quantifying the skill level of animal workers of various backgrounds and self-reported skill levels, some inferences may be drawn about the relationship between animal worker skill level and risk for injury. The development of a system for scoring animal handler skill levels will provide a basis for feedlots to assess the skill level of new hires, and to provide targeted training, which can potentially reduce training time and increase the efficacy and efficiency of training with the training target identified.

## Method

We are using a multinomial logit framework based on the classification of the injury from EMS to quantify the estimated health costs of injuries on livestock operations. We are also developing a training protocol to reduce the impact of work-related injuries at the time of sorting and processing.

## Data Collection

The workplace-related injury data comes from the NEMSIS research database housed at the University of Utah. It is one of the largest databases for severe livestock work-related injuries. It provides information about the patient and their health history, a description of the incidence, and any medical services provided.

The data on animal handling used to develop training protocols comes from Colorado State University.

## Accomplishments

We reached out to Colorado State University to see if there were data on animal handling and workplace injury. We were able to secure a dataset that tracked animals during handling and their subsequent performance in the feedyard. We are now using this data to develop training tools and protocols for animal handling.

So far we have:

- Obtained the data from NEMSIS
- Obtained the data from CSU
- Hired a student to begin cleaning data
- Developed the training tool for animal handling and processing

Based on the preliminary data collected, we submitted another grant to USDA-NIFA worth \$249,000 on August 10, 2023. We will hear back from this grant in the middle of December.



# Outreach

Dr. Debra Romberger

## Project Aims

- 1. Identify information from CS-CASH research, pilot projects, and external research, and translate these findings into comprehensive outreach training, demonstrations, media messaging, and targeted resources, focusing on translating research relevant to vulnerable worker populations and exploring data that will uncover emerging issues.**
- 2. Implement injury prevention safety training and disseminate targeted education to workers in high-risk agricultural industries.**
  - Emphasize training vulnerable populations, including immigrant and migrant workers, Native Americans, and young and beginning farmers, using proven communication channels and training modalities in collaboration with trusted partners.**
  - Improve health outcomes for agricultural workers by training rural health care providers using continuing education courses and hands-on training.**
- 3. Increase the capacity of rural healthcare professionals to identify, refer, and treat agricultural workers who may benefit from mental health services and resources by using the innovative FarmResponse training.**
  - Provide training to rural community members using a Gatekeeper Question, Persuade, Refer (QPR) training modified for agricultural communities, enabling trainees to identify and refer agricultural workers who may benefit from mental health services and resources.**

## Accomplishments

The Central States Center for Agricultural Safety and Health (CS-CASH) outreach program continues to promote interventions that the agricultural workforce, their families, and communities can effectively adopt and sustain across the region and the nation, thereby contributing to long-term improvements in agricultural worker health and safety. Throughout the past year, the outreach team met and conducted training with agricultural producers and workers, vulnerable worker populations, and healthcare providers who serve the farm and ranch workforce. We continue to work with partner organizations, including the AgriSafe Network, Ag Health and Safety Alliance, USDA Extension Service, AgrAbility, Grain Handling Safety Coalition, Farm Bureau, Women in Agriculture Organizations, agri-insurance, media organizations and journalists, and other NIOSH-funded Agricultural Centers.

In the past year, we hired a full-time communications specialist, Kelsey Irvine, allowing us to expand significantly the reach of our stakeholder interactions. Working with CS-CASH researchers and other content experts, we have generated new educational resources, demonstration materials, and training curricula shared with workers at the more than 408,000 farms and ranches in the CS-CASH region.

Critical safety and health information is shared during training at agricultural events, by media outlets, through social media, and via the Center’s extensive communication database. Monitoring surveillance data has allowed a rapid response to immediate concerns affecting ag workers, including the Avian Influenza outbreak in poultry facilities in 2023. Face-to-face outreach at agriculture-focused events has continued to be an effective method to train, demonstrate, and discuss proven safety and health measures and rapidly disseminate information on emerging issues.

Using new, innovative outreach, CS-CASH has worked with AgriSafe and other trusted partners to specifically address stress, mental health, and suicide in agricultural workers, train grain handling workers, and conduct train-the-trainer fit testing with USDA Extension. Our partnerships are essential in providing sustainable, far-reaching outreach.

## From Benchtop to Boots on the Ground: Transforming Data into Outreach Materials

The outreach team moves safety and health research information from CS-CASH investigators into resource materials, training curricula, and emerging issue announcements. Examples of how data was transformed into outreach in the past year (additional information can also be found in each project report throughout this document):

**Emerging Issues Program Educational (electronic and hardcopy) materials and training curriculum developed in response to the Avian Influenza outbreak and African Swine Flu threat in 2023.** We developed materials in collaboration with AgriSafe, Nebraska State Veterinarian, and the National Pork Board on reducing stress during depopulation of poultry and swine during possible foreign disease outbreak, such as African Swine Flu. In 2023 resources were disseminated via targeted social media messaging via Facebook, Twitter and Instagram, during interviews with media, presentation to healthcare professional during the 2023 Ag Health and Safety Course, at the Nebraska Poultry Association Conference and the National Pork Board Conference, and during meetings with other NIOSH Ag Center personnel.



**Avian Influenza & Farmers' Mental Health**

**About Avian Influenza**  
Avian Influenza (AI) is a disease caused by a group of viruses that are particularly effective at spreading among birds. Avian influenza is spread through contact with fecal droppings, saliva, and nasal discharges of infected birds. A farm with detected avian influenza must quickly and humanely depopulate the affected flock. The farm is then thoroughly disinfected to kill all traces of the virus.

**Impact on Farmers**  
Caring for animals and being faced with a depopulation situation can create stress for producers and workers. Stress happens to all of us and it is normal to feel overwhelmed, especially during tough times. If you feel anxious or depressed, you are not alone. Beyond your friends and family, there are many resources to help.

**Know the Signs of Stress and Depression**

- Persistent worry and fear
- Apprehension and uneasiness
- Avoiding others
- Feeling bad
- Lack of interest or pleasure in activities
- Significant weight change or changes in appetite
- Problems sleeping
- Slow or flighty body movements
- Low energy/fatigue
- Difficulty concentrating
- Frequent thoughts of death or suicide
- Substance misuse
- Unexplained changes in physical appearance or behavior
- Headaches
- Feelings of isolation
- Anger
- Feeling numb

**Being prepared with information on the current status and health of you and your workers will help relieve stress.**  
Use our smart sheet to scan the QR code or click here to review PPE guidelines for Avian Influenza.

Visit [go.unmc.edu/AI-mental-health](https://go.unmc.edu/AI-mental-health)

Or use your smartphone to scan the QR code.





**Foreign Animal Diseases & Farmers' Mental Health**

**Foreign Animal Diseases**  
A foreign animal disease (FAD) is an animal disease not currently in the U.S., and an outbreak could severely impact animal health and the U.S. economy. In the swine industry, FADs of greatest concern include African swine fever (ASF), classical swine fever (CSF), and foot-and-mouth disease (FMD). FAD preparedness and response activities help ensure we are ready to both prevent and respond to potential FAD introductions. However, the threat of severe animal disease, high mortality, production losses, and potential financial impact can be taxing on our mental health. While we are taking care of our herds, we must take care of ourselves.

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Use our smart sheet to scan the QR code or click here to review PPE guidelines for Avian Influenza.

Visit [go.unmc.edu/FAD-mental-health](https://go.unmc.edu/FAD-mental-health)

Or use your smartphone to scan the QR code.





## Pilot & Feasibility Program

In 2023 the outreach and evaluation teams worked with each of the 6 new pilot program investigators to ensure that their research proposals include a plan of for translation and dissemination of findings.

## The Exposome and Organic Dust-Induced Lung Injury

In 2023, Dr. Todd Wyatt and the Ag Health and Safety Alliance team worked to create a female focused respiratory protection resource that is geared toward poultry producers. This resource will be ready for dissemination in Fall 2023.

## Multiple Methods Approach to Study the Impact of Stress among Latino Immigrant Cattle Feedyard Workers in the Central States Region

Dr. Athena Ramos' research team created flyers and informational videos in 2023 for the project's Feedyard Health Fairs. These bilingual videos educate the participants about what to expect and how to interpret the results that they receive. These resources can be used by other healthcare professionals who wish to conduct health fairs in occupational settings. CS-CASH outreach materials have been translated into Spanish, shared with project participants and placed on the [Feedyard Safety team's website](#). The project website was developed and is maintained by the outreach team.



### LEARN MORE ABOUT THIS WORK

Visit [go.unmc.edu/immigrant-workforce](https://go.unmc.edu/immigrant-workforce)  
Or use your smartphone to scan the QR code.



## Improving Safety Climate and Safety Culture in the Cattle Feedyard Industry

The outreach team worked closely this year with Dr. Aaron Yoder to review and refine the Feedyard 15 safety training modules. Additional bilingual training materials have been developed and translated by the outreach team in response to advise from the Feedyard Safety project advisory board. These materials have been disseminated during feedyard safety trainings, at industry conferences and are available on the [Feedyard Worker Safety project website](#). The project website was developed and is maintained by the outreach team.



### CHECK OUT THE FEEDYARD WORKER SAFETY WEBSITE

Visit [go.unmc.edu/feedyard-safety](https://go.unmc.edu/feedyard-safety)  
Or use your smartphone to scan the QR code.



## Establishing a Community-Based Training Network to Enhance Bison Herd Workers Safety on Tribal Lands

The outreach team is working with Dr. Mystera Samuelson to create a culturally appropriate, worker-informed safety training guide. During the 2023 Bison Worker Safety Roundtable, Kelsey Irvine led a discussion with the participants about their ideas for the safety resource. The outreach team developed and maintains the [Bison Worker Safety website](#).



### CHECK OUT THE BISON WORKER SAFETY WEBSITE

Visit [go.unmc.edu/bison](https://go.unmc.edu/bison)

Or use your smartphone to scan the QR code.



## Surveillance of Agricultural Injury, Illness, and Stress in the Central States Region

The outreach team worked closely this year with Dr. Risto Rautiainen to track injuries and fatalities in our 7-states region using [news clip data](#), and to develop prevention resources in response to emerging issues and reoccurring threats to safety and health.



### VIEW NEWS CLIPPING DATA






Visit [go.unmc.edu/fatalities-injuries](https://go.unmc.edu/fatalities-injuries)

Or use your smartphone to scan the QR code.





## CS-CASH Social Media Platforms & Stakeholder Reach

MEDIA	REACH
 <p>Facebook @unmccscash <a href="https://facebook.com/unmccscash">facebook.com/unmccscash</a></p>	<ul style="list-style-type: none"> <li>• 775 total fans</li> <li>• 508 posts in the year</li> <li>• 3,064 page engagements, including: 2,678 reactions, 297 shares, 89 comments</li> </ul>
 <p>Twitter @unmccscash <a href="https://twitter.com/unmccscash">twitter.com/unmccscash</a></p>	<ul style="list-style-type: none"> <li>• 288 total followers</li> <li>• 415 tweets in the year</li> <li>• 1,498 post key interactions, including: 1,083 likes, 362 retweets, 35 quote tweets, 18 replies</li> </ul>
 <p>Instagram @unmccscash <a href="https://instagram.com/unmccscash">instagram.com/unmccscash</a></p>	<ul style="list-style-type: none"> <li>• 88 total followers</li> <li>• 419 posts in the year</li> <li>• 599 post engagements (likes, comments, and saves)</li> </ul>
 <p>Flickr @cscash <a href="https://flickr.com/photos/cscash">flickr.com/photos/cscash</a></p>	<ul style="list-style-type: none"> <li>• 2,652 copyright free ag safety and health photos taken by CS-CASH members</li> <li>• 814,232 lifetime views</li> </ul>
 <p>U.S. Ag Center YouTube @USagCenters <a href="https://youtube.com/usagcenters">youtube.com/usagcenters</a></p>	<ul style="list-style-type: none"> <li>• U.S. Ag Center collaborative channel</li> <li>• CS-CASH created 31 of the videos</li> <li>• Channel videos have 734,000 views, 60,700 watch time hours</li> </ul>

## CS-CASH Newsletter

The CS-CASH newsletter is sent to 2,949 agricultural employers, safety professionals, researchers, industry stakeholders and the Center's partners four times a year. The newsletter informs readers about new CS-CASH educational resources, funding announcements, and training opportunities as well information from our community and research partners. We invite new subscribers to sign up for the newsletter.



### LEARN MORE ABOUT THE NEWSLETTER

Sign up & view past issues.

Visit <https://go.unmc.edu/cs-cash-newsletter>

Or use your smartphone to scan the QR code.



## Regional Print & Live Media Interviews

CS-CASH members continued to offer their expertise to regional and national newspapers, agricultural trade journals, radio, podcasts, and TV, addressing health and safety issues relevant to agricultural audiences. Some of the 2022-2023 articles and broadcasts can be found on the CS-CASH website.



### VIEW REGIONAL PRINT & LIVE MEDIA INTERVIEWS

Visit [go.unmc.edu/cs-cash-other-media](https://go.unmc.edu/cs-cash-other-media)

Or use your smartphone to scan the QR code.



## Associated Press Ag Safety & Health Media Releases

Ag journalist Loretta Sorensen continued to create articles monthly on topics related to translated research, emerging issues, and topics of regional concern. The articles are sent to the Associated Press for distribution and have been run in newspapers and journals across the U.S. In addition, Sorensen writes a quarterly CS-CASH safety column in the print and online agricultural magazine Grit. After publication, the articles are posted on the CS-CASH website and shared on the Facebook page for use by others in their outreach endeavors.



### VIEW MEDIA RELEASES

Visit <https://go.unmc.edu/cs-cash-news>

Or use your smartphone to scan the QR code.



## Ag Health & Safety Video Production

In the past year CS-CASH produced and collaborated on two high-quality videos for use on the NIOSH AFF Center collaborative U.S. AgCenter YouTube Channel. Both videos address issues that are high-priority concerns for CS-CASH. An ATV Safety stop motion video made in collaboration with the Ag Health and Safety Alliance provides a great resource for those training young ATV riders.



### WATCH "ATV SAFETY: WHAT'S THE BIG DEAL?"

Visit <https://www.youtube.com/watch?v=3q43E4lQdBQ>

Or use your smartphone to scan the QR code.



The Stop the Bleed in Agriculture video, created in partnership with Dr. Eric Ernest at the Nebraska Medicine Emergency Department, provides agricultural workers, their families and community the knowledge required to assist a wounded worker until professional help arrives. Both videos have been well received by the public.



### WATCH "STOP THE BLEED IN AGRICULTURE"

Visit <https://www.youtube.com/watch?v=tKjq71R73tM>

Or use your smartphone to scan the QR code.



**Used in the right circumstances,  
a tourniquet can be life and limb saving**

## Collaboration with Regional & National Organizations

Partnerships are the Center’s superpower! Working with our trusted collaborators and an extensive network of organizational contacts we have been able to multiply our impact and reach. Some of our partnerships in the past year are listed below.

### CS-CASH Collaborative Outreach, September 1, 2022 - August 31, 2023

COLLABORATING ORGANIZATION	PROJECT NAME	DESCRIPTION
<b>NE Extension</b>	ATV Aware	In collaboration with Nebraska Extension we support the maintenance of the ATV Simulator, a full sized ATV on a rocker table that is transported on a trailer. This training device was used during 9 trainings across Nebraska, including the Nebraska State Fair and several other large multi-day events.
<b>Grain Handling Safety Coalition (GHSC)</b>	Safe Grain Handling and Ag Infectious Disease Trainings	In collaboration with the GHSC, CS-CASH outreach members presented webinars and in-person training to grain handling industry workers on Grain Bin Entry, Tractor and Equipment Safety, Winter Weather Hazards, Respiratory Protection, and a series of infectious disease trainings that were funded through an OSHA Susan Harwood grant.
<b>NE Extension</b>	National Safe Tractor and Machinery Operation Program (NSTMOP) Course and “Hand-on” Safety and Health Fair	In partnership with Nebraska Extension, CS-CASH provided training at 8 sites in 2023 to fulfill requirements for young workers to become certified to operate tractors and equipment. Using the National Safe Tractor and Machinery Operation Program (NSTMOP) curriculum and extensive add-on trainings such as Stop the Bleed, emergency response, PPE, and ATV Aware, 110 students received certification. Students successfully completing this training are able to receive an animal husbandry permit from their DMV state office. In response to suggestions on the course evaluations, in 2023 CS-CASH and NE Extension hosted a new initiative with two, two day-long community “hands-on” safety events. These events provided an opportunity for young workers, their families, and the community to take part in interactive training related to tractors, agricultural equipment, PPE, ATV, and other safety topics.

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COLLABORATING ORGANIZATION	PROJECT NAME	DESCRIPTION
<b>OSHA Grain Handling Safety Alliance</b>	OSHA Alliance Stand-up for Grain Safety Kick-off Event	For the 4th year, CS-CASH in collaboration with the Grain Handling OSHA Alliance Coalition and others assisted in planning, executing, and training for the Alliance Stand-Up for Grain Safety Week: <a href="http://standup4grainsafety.org">standup4grainsafety.org</a>
<b>Progressive Agricultural Foundation (PAF)</b>	PAF Safety Days Presentations	This year CS-CASH continued a long-term, successful partnership with PAF presenting at 8 safety and health trainings and providing resources at Safety Days throughout the CS-CASH 7-states region. Training curriculum and age-appropriate resources included hearing conservation, sun safety, zoonotic disease, and respiratory protection.
<b>Nebraska Pesticide Safety Education Program</b>	Fit Testing – Train the Trainer	CS-CASH collaborated with the Nebraska Pesticide Safety Education Program training pesticide applicator trainers in the process of conducting respiratory fit testing. These trainings were conducted using materials developed by CS-CASH and the Ag Health and Safety Alliance: <a href="http://go.unmc.edu/fit-testing-guidebook">go.unmc.edu/fit-testing-guidebook</a>
<b>National Extension</b>	eXtension.org website	CS-CASH outreach member Dr. Aaron Yoder was instrumental in the development of the Farm & Ranch eXtension in Safety and Health (FReSH) Community of Practice (CoP) at eXtension.org. This collaborative effort between universities, industry, and government provides user-friendly information for the general rural population, agricultural producers, and agricultural safety and health professionals. New resources were added in 2022-2023 and the website received an update.
<b>Pennsylvania State University (PSU), Ohio State University (OSU)</b>	AgSafety4u	Developed by Dr. Aaron Yoder in collaboration with PSU and OSU, AgSafety4u (Level 2) is a web-based training module that provides an overview of identification and control of hazards common to farms and agriculturally related rural businesses, focusing on hazards associated with machinery, structures, equipment, animals, chemicals, and outdoor environment. Dr. Yoder continued to provide updates and expanded the web-based training tool this past year.

## Agricultural Safety Center Outreach Collaborations

The CS-CASH outreach team maintained and established cross-Center collaboration with all centers in multiple areas of mutual interest over the past year. Coordinated outreach efforts with other Centers is described below.

### CS-CASH Collaborative Outreach, September 1, 2022 - August 31, 2023

COLLABORATING NIOSH AFF CENTERS	PROJECT NAME	DESCRIPTION
<b>All</b>	US Ag Center YouTube Channel	CS-CASH to work with all of the NIOSH AFF Centers on the USAg Center YouTube Channel. Established in 2013, the AFF Centers collaborated to initiate a joint YouTube channel to raise awareness of agricultural, forestry and fishing occupational hazards; provide information to prevent AFF injuries and illnesses; increase the visibility and sphere of influence of the AFF Centers; and establish a model of collaborative work that can be replicated by other organizations. Dr. Aaron Yoder continued to serve as the USAg Center YouTube webmaster, maintaining the site and adding videos and Ellen Duysen continued to manage the comments and reporting site analytics during the Ag Center ECO group meeting.
<b>All</b>	Ag Centers' Evaluators, Coordinators and Outreach (ECO) Group	Our Center members collaborate with other NIOSH-funded Ag Centers through the Evaluators, Coordinators, and Outreach (ECO) group. In 2012, the ECO group launched with the goal to enhance cross-center collaboration through 1) sharing resources and learning, and 2) workgroups focused on collective outreach campaigns. The ECO group meets regularly and functions as a foundation for center collaboration and public communications for the national AFF safety and health initiative.
<b>Ag Centers and Ag Safety Organizations in the Midwest</b>	Coordinated Outreach at Farm Shows	CS-CASH continued to partner with other regional Ag Centers and safety organizations with "boots on the ground" outreach at large farm shows across the Midwest. Sharing space and coordinating trainings allows us to save money, provide impactful ag safety and health training and education to large numbers of agricultural workers, and demonstrate coordinated efforts of the NIOSH AFF program. In 2023 CS-CASH collaborated with other organizations at large events including Husker Harvest Days, Farmfest and the National Association of County Agricultural Agents Conference and Nebraska Cattlemen's Conference.

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COLLABORATING NIOSH AFF CENTERS	PROJECT NAME	DESCRIPTION
<p><b>UMASH and National Children's Center for Rural and Agricultural Health and Safety (NCCRAHS)</b></p>	<p>Telling the Story Project</p>	<p>Since 2016, CS-CASH has partnered with UMASH and NCCRAHS on the "Telling the Story Project," a translation activity that conveys injury prevention messaging through personal narratives, based on first-hand experiences. These stories and relevant prevention messaging and resources are stored on a dedicated website that has accessed over 36,000 times. Utilizing videotaped interviews and written narratives, the Telling the Story Project allows those who were involved in an agriculture incident, or a family member of those who had a fatal incident, to share their story. The website houses written narratives, videos, educational resources, safety vignettes and discussion guides created by the Telling the Story team. The stories have been used as both a pedagogical tool with agricultural workers and students and as a valuable resource for those working in the field of safety. Stories on the website have been picked up by numerous media sources to expand on agricultural safety and health messaging.</p>



### **Agricultural Safety and Health Training Course**

Since 2011 CS-CASH has hosted a 36-hour Agricultural Safety and Health Course at UNMC College of Public Health. The course includes a 4-hour farm tour. As a "Thank You to Healthcare Providers", this course has been offered free of charge since 2020. Dr. Aaron Yoder and Ellen Duysen serve as the course directors. Dr. Kelley Donham, founder of the original course in 1990, continues to teach a portion of the content. Since 2011, over 850 participants have received training and been eligible for AMA, Nursing, and EMS continuing education credit (36 hours) through the UNMC Center for Continuing Education and UNMC graduate-level academic credit (3 hours). In 2023 there were 92 online and in person attendees. Students have included rural and urban health care professionals, veterinarians, public health professionals, Extension Educators, and Public Health and Pharmacy graduate students.



**LEARN MORE ABOUT THIS WORK**

Visit <https://go.unmc.edu/ag-safety-course>  
Or use your smartphone to scan the QR code.



# CS-CASH OUTREACH ACTIVITIES BY THE NUMBERS

## SEP 1, 2022 - AUG 31, 2023

**148**

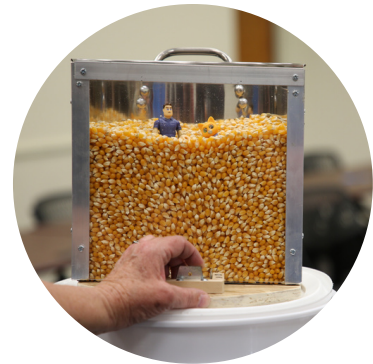
course/curriculum, material distribution, training demonstration, workshop, conferences

**55**

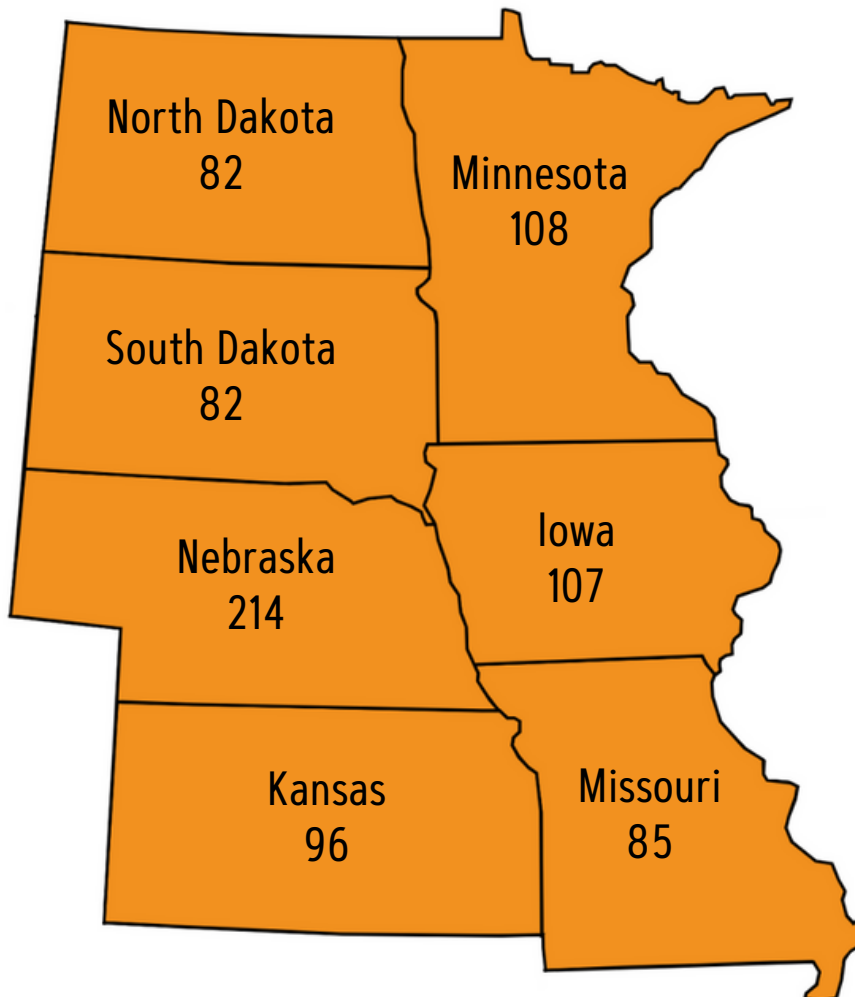
oral presentations, posters, reports, non-peer reviewed articles, educational materials, consultation, interviews, newsletters, videos

**8**

evaluation instruments, surveys



### REGIONAL OUTREACH ACTIVITY





# Outreach to Increase Mental Health Awareness Among Agricultural Communities

Collaboration with AgriSafe

## Project Aims

- 1. Increase the capacity of health professionals to identify, refer, and treat farmers that may benefit from mental health services/resources.**
- 2. Increase the capacity of health professionals to identify, refer, and treat farmers that may benefit from mental health services/resources.**
- 3. Implement evidence-based suicide prevention training to agricultural communities.**

The Midwest region ranks as having some of the lowest access to behavioral health care (NAMI-Midwest). Existing behavioral health providers are taxed to meet the demands of a diverse population of clients seeking services while primary care providers are placed into the role of providing behavioral health services on a continuum basis as a safety for the population. To address mental health awareness and education needs for the agricultural population, AgriSafe is working in collaboration with CS-CASH to provide evidence-based research trainings for rural healthcare providers as well as agricultural producers and their families.

Fiscal year one included strategic efforts to identify agriculture producer organizations, rural health care organizations, and commodity association partnerships working in the underserved behavioral health counties in the states served by CS-CASH (ND, SD, NE, KS, MN, IA, and MO). These outreach efforts yielded significant impact in securing training opportunities in the areas of women's mental health awareness, suicide prevention training for rural Ag Business and Ag producers, young producer and community mental health awareness, herd depopulation and farmer resiliency with commodity associations such as the National Pork Checkoff association and cultural competency trainings (FarmResponse™) with behavioral health professionals via the ECHO (Extension for Community Healthcare Outcomes) program.

The AgriSafe Mental Health Awareness project team's collaborative efforts included outreach strategy to market, register, and schedule trainings. Digital and print promotional flyers were created as well as health communications media releases to increase awareness and interest in Mental Health trainings.

The Mental Health Awareness Trainings (MHAT) took a direct approach of addressing suicide ideation and risk in agricultural communities by training learners to recognize and respond to a mental health crisis, namely reducing suicidal behaviors and saving lives using the Question, Persuade, and Refer (QPR) approach. QPR is an evidence-based practice listed on the National Registry of Evidence-based Practices and Polices ([www.qprinstitute.com](http://www.qprinstitute.com)). QPR for Farmers and Farm Families is a 1.5-hour training specifically designed to describe the unique challenges *continued*

farmers face that may lead to stress, depression, and suicide as well as implementing the QPR components with someone at risk for suicide. First year QPR objectives and goals were surpassed using AgriSafe’s impressive virtual training platform as well as in-person trainings.

**FY1 metrics**  
Virtual training = 63/140% goal reached  
In-person training = 26/ 58% goal reached

Health care professionals’ organizations serving agricultural producers were identified and marketing materials were created to link professionals in the CS CASH service region to AgriSafe’s FarmResponse™ training. FarmResponse™ is a 3.5-hour health provider training that addresses farm and ranching cultural competencies, financial stress, land ownership, and legal issues, and the work of agriculture relevant for communication, and collaborative mental health strategies. This training is delivered on-demand through AgriSafe’s Learning Lab for the busy healthcare professional. Upon successful completion, healthcare professionals receive a continuing education credit that can be used for their professional license

**FY1 metrics**  
Individuals registered = 55  
Course completions = 21  
FarmResponse™ promotional reach= 1,951

renewals. First year registrations and program completion indicate a strong interest and need for continued outreach collaboration.

Additional MHAT trainings included panel presentation consisting of women agriculturists willing to address the variety of roles women adopt to take care of their families, rural communities, and farms/ranches. These roles may lead to overwhelming physical and mental stress impacting individual and family health. Panelists identify common stressors as well as doable stress mitigation strategies. These coffee chat style conversations have been strongly accepted in several female producer networks.

**FY1 metrics**  
Virtual training = 128 participants  
In-person training = 160 participants

The concept of One Health to drive innovation and sustainably care for hog producers was practiced at the 2023 World Pork Expo in Des Moines, Iowa. Community Health Director Linda Emanuel worked alongside of professionals of the National Pork Check-off board to meet with producers and discuss mental wellness strategies as well as emergency preparedness strategies in the event of a Foreign Animal Disease outbreak. Connecting producers with resources to ease current stresses and encourage healthy solutions is real innovation.



AgriSafe’s project work in increasing mental health awareness is guided by AgriSafe’s Total Farmer Health® model. The Total Farmer Health® model is a visual representation of factors contributing to mental stress and physical harm for the farmer. Our proposal is based upon the principle that to achieve Total Farmer Health®, one must have a healthy mind and a healthy body. Using this principle, AgriSafe can connect with producers to identify hazards threatening both physical and mental health as well as create a partnership to share community resources.

The work of the Total Farmer Health coach was borne out of this concept as a means to provide “Boots on the Ground” health care professionals who understand the culture of agriculture and are able to make meaningful connections to increase mental health awareness. Six health care clinicians and behavioral health professionals have been employed to train on the QPR for Ag Communities program as well as increase healthcare clinician awareness of the FarmResponse™ program.

Numerous producer publications, podcasts, and rural health articles were published bringing awareness to the specific mental health issues and resources available for the targeted audience.

**FY1 publication and podcast metrics for reach:**  
14,033 individuals

### LEARN MORE ABOUT THIS WORK



#### **September Newsletter: North Central Farm and Ranch Assistance Center**

Visit [emails.illinois.edu/newsletter/55/630729155.html](https://emails.illinois.edu/newsletter/55/630729155.html)

Or use your smartphone to scan the QR code.



#### **“Hopeful Forecasting”: Farmers Showing Increased Interest in Mental Health Resources**

Visit [ruralhealthinfo.org/rural-monitor/farmer-mental-health](https://ruralhealthinfo.org/rural-monitor/farmer-mental-health)

Or use your smartphone to scan the QR code.



#### **Nebraska Safety Council Podcast - Live at Hail Varsity Club (Facebook Live)**

Visit [facebook.com/NebraskaSafetyCouncil/videos/743009890827776](https://facebook.com/NebraskaSafetyCouncil/videos/743009890827776)

Or use your smartphone to scan the QR code.



Additionally, mental health topic discussions may be accessed via AgriSafe’s Talking Total Farmer Health podcast library [Talking Total Farmer Health - AgriSafe Network](#). Experts doing research in the field of mental health topics specifically connected to the agricultural population are hosted in a casual conversation within this media platform.



### LEARN MORE ABOUT THIS WORK

Visit <https://www.agrisafe.org/podcasts/talking-total-farmer-health/>

Or use your smartphone to scan the QR code.



In 2022-2023, the CS-CASH and AgriSafe collaboration yielded significant returns in promoting Mental Health Awareness Trainings as well as building capacity to continue to outreach efforts to underserved regions of the CS-CASH service area.

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