# TABLE OF CONTENTS

**Section I**

CS-CASH Summary, Relevance and Key Personnel .................................................. 3

**Section II Program Project Highlights**

Improving Safety and Health in the Cattle Feedyard Industry .......................... 4

Health and Safety Risks among Immigrant Cattle Feedyard Workers ................. 6

Agricultural Dust-Induced Airway Injury and Repair: An IL10 Centered Approach ... 8

Increasing Personal Protective Equipment Use by Point Source Protection Strategy 12

Enhancing the Health and Safety of Range Bison Herd Workers ..................... 14

Surveillance of Agricultural Injuries ................................................................. 16

Evaluation ........................................................................................................ 19

Pilot Project Program ...................................................................................... 21

Emerging Issues ............................................................................................... 37

Outreach Program ............................................................................................ 40

Core Program Activity Database Year 8 ............................................................ 51

CS-CASH Publications Year 8 ........................................................................ 52
CS-CASH 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.

CS-CASH Relevance
The Central States Center for Agricultural Safety and Health (CS-CASH) serves a highly productive agricultural region: North Dakota, South Dakota, Nebraska, Kansas, Minnesota, Iowa, and Missouri. CS-CASH partners with NIOSH and other Ag Center, and works towards fulfilling our common mission to improve health and safety and reduce the burden of injury and illness in agriculture.

Key Personnel

<table>
<thead>
<tr>
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<th>Position</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Risto Rautiainen, PhD</td>
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</tr>
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<tr>
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Section II. Program/Project Highlights || Research Projects

Improving Safety and Health in the Cattle Feedyard Industry || Dr. Aaron Yoder

Project Aims

This Project aims to develop and implement a comprehensive feedyard safety and health training program and to evaluate the efficacy of this training program.

- Review and develop bilingual training materials for a comprehensive feedyard worker safety and health training program;
- Obtain qualitative information about the safety culture among feedyard managers and workers using the multi sited ethnography method;
- Refine and implement the comprehensive safety and health training program at fifteen participating feedyards in Nebraska and the region;
- Evaluate the injury and illness experience in the beef production industry using existing and newly collected injury and illness information; and
- Evaluate the effectiveness of the feedyard safety and health training program in reducing the number and cost of injuries and illnesses, and improving the safety culture on participating feedyards.

Few research projects have addressed health and safety issues in the feedyard sector. The Central States Center for Agricultural Safety and Health (CS-CASH) is ideally located to conduct such research, as half of the feedyards in the US are located in the Center’s region. In 2015, the Center’s seven-state region (IA, KS, MN, MO, NE, ND and SD) had 556 cattle feedyards and 6687 feedyard employees, representing 51% of all feedyards and 48% of feedyard workers in the US.

Collaborative Research. Collaborating with Mike Keenan, a feedyard safety expert at Gallagher Insurance has provided critical contacts at regional feedyards, expert background into the costs of worker injuries and fatalities and information on the current methods used to improve safety on Midwestern feedyards.

In 2014, the occupational fatality rate was 116 fatalities/100,000 workers in the beef cattle ranching and farming industries (including feedyards). This rate was four times higher than the rate in the agriculture, forestry, and fishing sector overall (24.9/100,000) and 34 times higher than the rate in all industries combined (3.4/100,000).
Development of the Feedyard 15 Training Modules. The project team has reviewed existing safety and health programs and materials that apply to feedyard workers. This has led to the creation of the Feedyard 15 training program that targets the 15 top priority safety and health hazards on feedyards. Training materials are in use by research feedyards during in-person trainings. Materials are available in both English and Spanish.

Commendation Program. The project team has developed a structure for a commendation program to recognize feedyards that conduct monthly safety trainings for twelve consecutive months. Recruitment of feedyards to participate in this commendation program continues.

Presentation of Preliminary Findings. Preliminary results from the survey, Feedyard 15 program and commendation program were presented to the beef industry and safety and health professionals at trade shows, professional conferences and through peer reviewed publications. A safety needs survey of feedyard managers and owners resulted in publication of the research findings in the Journal of Agromedicine.

A new website highlights this research project: [https://www.unmc.edu/publichealth/feedyard/](https://www.unmc.edu/publichealth/feedyard/)

Publications/Presentations - Year 2.


Health & Safety Risks Among Immigrant Cattle Feedyard Workers in the Central States Region || Dr. Athena Ramos

Project Aims

This project aims to systematically explore and describe the health status and occupationally related risks among Latino immigrant cattle feedyard workers in Nebraska and Kansas;

Test the Ecological Stress-based Model of Immigrant Health and Safety, which predicts if workers’ intrapersonal mechanisms (i.e., stress appraisal, ethnic identity, and cultural values) mitigate culture-related occupational stress and negative health outcomes; and

Review, develop, evaluate, and disseminate bilingual (English/Spanish) health and safety and policy materials designed specifically for cattle feedyard operations.

Immigrant Cattle Worker Surveys. Health status and occupational risk interviews have been conducted with 190 immigrant feedyard workers in Nebraska and Kansas. Preliminary data analysis has begun. Interviews will continue through November 2019.

Website Development. A website in both English and Spanish has been developed as an informational portal and as a method to recruit additional research participants.

www.unmc.edu/publichealth/feedyard

Glossary of Feedyard Terminology. A bilingual picture glossary of feedyard terms is under development.

Monthly Meetings with Research Team and Stakeholders. Researchers from the fields of health disparities, occupational safety, clinical medicine and psychology make up the research team. Team meetings are held monthly to discuss progress towards the project goals. Two in-person team meetings were held in 2019. At the spring 2019 meeting, the research team took a tour of a working feedyard in Nebraska and talked with feedyard workers and managers.

Material Development. Educational materials have been developed including bilingual flyers on bovine tuberculosis and on prevention of back injuries. These materials are posted on the CS-CASH website and have been widely disseminated.

https://www.unmc.edu/publichealth/cscash/news/.Spanish-resources.html

FEEDYARD WORKFORCE

U.S. cattle feedyards are a $36.4 billion industry. According to the U.S. Bureau of Labor Statistics, 52.5% of the feedyard workforce is Hispanic/Latino, and many of these workers are immigrants. Understanding Latino immigrant cattle feedyard workers’ health status, unique risk and protective factors, and specific occupational educational and training needs are imperative to addressing the health and safety risks within cattle production and the long-term economic impacts of such problems.
**Publications/Presentations - Year 2.**


Ramos, A.K. *Agriculture, labor, and immigration*. Rural Route Radio, Syndicated radio program (Colorado, Kansas, Missouri, Montana, Nebraska), February 1, 2019.


Agricultural Dust-Induced Airway Injury and Repair: An IL-10 Centered Approach || Dr. Todd Wyatt and Dr. Jill Poole

Project Aims

The long-term goal of this project is to determine molecular targets and approaches to accelerate lung repair following agriculture dust-induced airway injury to improve the health of exposed workers. The central hypothesis of this proposed project is that the anti-inflammatory/pro-resolving IL-10 cytokine is central for enhancing repair response to agriculture dust-induced airway injury.

Our specific aims are:

- Characterize the role of IL-10 in governing the post-inflammatory homeostasis repair and recovery response in an animal model of agriculture organic dust-induced airway injury.
- Identify the mechanism(s) of scavenger receptor A (CD204) in regulating the IL-10 response to agricultural dust using in vitro cell models and in vivo animal models.
- Determine the relationships between systemic IL-10 levels, IL-10 pathway genetic polymorphisms, and pro-inflammatory cytokine hyper-responsiveness in persons with prior agricultural exposure.

Agricultural Dust Exposures. Agriculture involves workplace exposure to a variety of organic dusts from plants and animals that have proven to cause long-term lung disease in some, but not all, of workers exposed. Engineering changes to future buildings where dust-generating work occurs does not address previous exposures and currently existing disease.

Mechanisms of Organic Dust Lung Injury. Over the years, we have learned quite a bit about the mechanisms of organic dust-induced lung injury, but we know little about how the lungs repair in response to such injuries. Some individuals recover effectively after dust inhalation with few lasting effects. Others fail to reverse the impact of chronic exposure injury and develop long-term chronic lung damage leading to diseases such as chronic obstructive pulmonary disease (COPD). The lungs can be thought of as “outside organs” as the cells lining the lungs are exposed to everything that we inhale. Lung cells recognized inhaled substances, debris, dust, and microbes through surface receptor proteins. One such family of these receptors is known as Scavenger Receptor.

Role of Interleukin-10. We discovered that scavenger receptor is necessary for proper repair after dust exposure. This takes place...
through the eventual production and secretion of a protein called Interleukin-10, which helps to turn off the inflammation caused by inhaling dust. Interestingly, people appear to express different amounts of this scavenger receptor and may have different receptor levels of action. It is our intention to clearly define the mechanisms of repair action cause by scavenger receptor and interleukin-10 so that we might minimize dust-mediated injury and maximize repair after injury using drugs that target the scavenger receptor as well as recombinant interleukin-10 therapies. Our current studies are focused on building a longitudinal mouse model of dust exposure that can quantitatively determine the lung structure during injury and repair using a novel technology of live animal lung imaging.

Organic dusts produce striking nodules of lung inflammation known as lymphocytic aggregates. The formation of these in the lungs of mice that have inhaled dust is a measure of the severity of lung injury. After 8 days of dust inhalation, mice were allowed to recover, or repair, for 3 days. Normal wild-type mice (WT) repair effectively whether they are given saline or IL-10 as a “drug.” If mice have been genetically engineered, or “knocked out,” to lack scavenger receptor (SRA KO) or interleukin-10 (IL-10 KO), repair from dust injury is profoundly prevented. Administering IL-10 to these knock out mice restores their repair process.

Publications


Abstracts.


Presentations/Outreach.


“Environmental Impact of Food Production on Worker Lung Health.” University of Nebraska-Lincoln, February 18, 2019.

Allergies and Respiratory Disease in Rural Farmers, RFD-TV; Live one hour interview with UNMC Chancellor Jeff Gold, Nashville, TN-Omaha, NE, filmed June 2019.

Targeting Resolution of Exposure-Induced Lung Inflammation, NIEHS Inflammation Resolution Biology Workshop, Research Triangle, NC, March 2019.

The Interaction Between Climate and Allergic Diseases, including Asthma, on a Worldwide Basis with Specific Consequences for Vulnerable Populations, American Academy of Allergy, Asthma & Immunology, San Francisco, CA, March 2019.
Increasing Personal Protective Equipment Use by Point Source Protection Strategy in Agriculture || Dr. Chandran Achutan

Project Aims

- Assess the participants’ baseline PPE use and exposures as potential targets for intervention;
- Conduct a randomized controlled trial to test if the Point Source Protection Strategy (PSPS), placing customized PPE Boxes near targeted exposures, increases PPE use; and
- Evaluate the feasibility and demand for the Point Source Protection Strategy (PSPS) and PPE boxes.

Farmer Recruitment. In year two of the project recruitment efforts were expanded extensively via mailer to reach 472 zip codes throughout Nebraska and Iowa. As of August 2019, 40 farms located in Nebraska and Iowa were enrolled with a total of 52 participants.

Farm Hazard Assessment. Hazard assessments and farmer questionnaires were completed for each of the control and intervention farms. These assessments inform the type of personal protective equipment (PPE) that is provided to each farm. The PPE questionnaire used in this study has been adapted for use by European colleagues.

Exposure Measurements. Exposures, including noise, ammonia and dust levels, were on participating farms. Exposure data provide information to the research team regarding the types of PPE that are required on each farm.

Respirator Fit Testing. Qualitative respirator fit tests were offered and provided to farmers at their request.

Customized PPE Boxes. Customized PPE boxes have been filled and installed on the intervention farms at locations where PPE is required. To date, 44 custom PPE boxes have been installed on grain bins, in storage sheds and in machine shops. Participants have input into where the boxes will be located. PPE kits have been delivered to the control farms. Information on PPE use and farmer perceptions is collected monthly. Some farm visits were delayed in spring 2019 due to the extensive flooding. Evaluation of the preliminary data has begun.

"I think the work you are doing is so important for our community and I’m glad we are part of this project.” (NE farmer)

"No-one has ever explained to me what those numbers on dust masks mean or why they are important - thanks for helping me figure out what masks to use and not to use!” (IA hog farmer)

“I'm hoping if my son sees me using this [PPE] it will encourage him to use it too when he's helping his dad” (IA farmer with 6 y.o. son)
Training. Farmers were provided with training on farm hazards pertinent to their farming operation, hazard controls (if applicable), and selection, fit and maintenance of PPE that was provided.

Preliminary Results. Baseline PPE use and exposure measurements have indicated that only 29% of participants use PPE every time they believe that it is needed. PPE questionnaire results indicated gloves and dust masks as the most common PPE items used (85% and 73% respectively) and hearing protection is the least common PPE item(s) used by farmers. While dust masks were cited as a commonly used item among farmers, upon investigation researchers discovered many farms used masks that were not NIOSH certified. This observation led the team to spend extra time with some farms on their second visits discussing what to look for when selecting respirators.

Presentations.


Enhancing the Health and Safety of Range Bison Herd Workers || Dr. Clayton Kelling

Project Aims

This Project aims to characterize injuries and hazards associated with working bison under contemporary conditions on tribal reservations and on non-reservation facilities, develop and implement intervention strategies to mitigate worker safety risks and assess outcomes and impacts of intervention strategies, and disseminate updated intervention strategies widely to bison herd managers and workers.

The bison industry is growing in the central states of the US with many tribal communities introducing herds into their agricultural operations. Tribal bison workers may have little to no training on the safe handling of livestock prior to working with these dangerous animals. Untrained workers and poor working conditions make bison handling a particularly hazardous occupation.

Research Partnerships. This research project is a collaboration between the University of Nebraska Lincoln, School of Veterinary Medicine, The InterTribal Buffalo Council and the Central States Center for Agricultural Safety and Health.

Observational Surveys. Researchers fill out an observational survey, designed to measure worker and animal safety hazards each year during tribal and non-tribal roundups.

Herd Manager Hazard Perception Survey. A manager perception survey determines the views of bison herd managers regarding: safety risks of environment and facilities, PPE and safety equipment, bison handling techniques, fear induced behavior, injuries, and safe use of animal medication.

Annual Facility Safety Checklist. A novel safety bison facility checklist was created that is used each year at research sites to catalog hazards and determine whether recommendations for change are followed. Recommendations are shared following each visit with bison herd managers. Interventions to address worker
safety issues are outlined in each report. Each hazard is linked to a picture allowing the herd manager to visualize the concerns outlined in the report.

**Facility Improvements.** Upon recommendation by the research team, a modern portable hydraulic chute was ordered to replace an existing chute used at a tribal herd location. Safety panels have been installed at sites, providing a barrier between the bison and the head chute workers (see pictures below). Ladders and walkways have been improved. Low stress handling methods are being discussed with managers. Changes to handling practices are anticipated. The tailgate-training guide created in year one is being used for new worker training.

**Bison Handler Workshop.** A first of its kind, Bison Worker Safety Roundtable was convened in Omaha Nebraska in spring 2019. This meeting brought together 28 tribal and non-tribal herd managers, researchers and other stakeholders to discuss common safety concerns, present data collected from the research, and discuss best practices for protecting bison herd workers. The participants were in agreement that they would like to have another roundtable held in spring 2020.

**Roundtable Discussion Topics**

- **Common Injuries**
  - Crushing of fingers/hand/arm
  - Needle sticks
  - Falls/trips from catwalks
- **Personal Behavior**
  - Culture that glorifies danger
  - Culture of respect and trust
- **Physical Environment**
  - Modifiable facility
  - Use of electronic ear tags
  - Work attire
- **Training Method**
  - Low-stress handling/hands-off approach
  - Walkthroughs/being aware of surroundings
  - Matching worker experience to assigned task
  - Reading animal body language
  - Videos
  - Safe methods for pregnancy testing

Addition of a worker safety panel following recommendation from the research team. Before this change the bison could turn after leaving the head chute and have direct contact with the herd workers and veterinarians.
**Surveillance of Agricultural Injuries || Dr. Risto Rautiainen**

**Project Aims**

The aims of the Central States Center for Agricultural Safety and Health (CS-CASH) surveillance are to conduct annual agricultural health and safety surveys in the Central States region (IA, MN, MO, KS, NE, ND, SD), and to explore alternative surveillance methods for injuries and illnesses, including analyses of existing administrative databases and tracking cases reported in the media.

In 2018-2019, CS-CASH implemented a new method for agricultural safety and health surveys replacing the system used in 2011-2015 where USDA National Agricultural Statistics Service (NASS) administered the data collection. CS-CASH obtained contact and agricultural production information from Farm Market ID for a random sample for 22,440 farm and ranch operations in the CS-CASH seven-state region. The sample was stratified by state and limited to those with email address and gross farm income of at least $5,000. Center staff administered all aspects of the survey in-house. The first round of data collection was completed, and the second round is scheduled for the first quarter of 2020.

The 2018 Farm and Ranch Health and Safety Survey was administered in two phases; first via email with a link to online survey, and second via mail using a hardcopy survey form. Emails were sent to 22,440 operations and paper forms were mailed to 16,818 operations, both with one reminder to non-respondents. Eight small prizes (value $100-$500) were offered as incentives to respond. The survey produced responses from 3,268 agricultural operations and 4,657 individual operators, up to three operators per farm/ranch. The response rate was 0.3% for the email survey and 19% for the mail survey. The characteristics of the responding vs. non-responding operations

**MEDIA MONITORING
FATALITIES AND INJURIES**

From 2012-2017 CS-CASH media monitoring captured 1048 injury cases; 586 (56%) were non-fatal and 462 (44%) were fatal. Most cases (85%) were captured from print media, which included a higher proportion of non-fatal injuries (58% vs. 41%) and roadway injuries (52% vs. 30%) compared to online reports. The numbers of fatality cases from media monitoring and the US Census of Fatal Occupational Injuries (CFOI) were almost identical (280 vs. 282, respectively), and the distributions by type of injury were similar. Media monitoring provides timely access to detailed information on individual cases, which is important for designing interventions and detecting emerging hazards.
were similar: any livestock 46/46%; cow-calf 16/16%; dairy 5/5%; wheat 40/47%; corn 90/89%; soybeans 86/84%, and hay 67/69%, respectively. The operator level dataset includes usable responses from 4,354 operators, 3,734 (86%) male and 620 (14%).

**Injuries.** A high percentage (90%) of principal operators had farming/ranching as their primary occupation versus approximately one-half in the Census of Agriculture. The rate of reported injuries doubled from the previous 7.1% (NASS-administered survey) to 14.9% in the new survey. The characteristics of injuries were similar; 27% were caused by livestock, 5% by tractors, 4% by ATVs, 18% by other machinery, and the rest by tools, structures, surfaces, and other sources. The average medical expenses from injuries were $15,261; $3,259 out of pocket and $12,002 paid by insurance. The breakdown of injury cases by body part is shown in Figure 1.

**Chronic health conditions.** In addition to injuries, the 2018 Farm and Ranch Health and Safety Survey was expanded to include chronic health conditions (respiratory, hearing, skin, musculoskeletal, stress), as well as exposures and protective measures related to these conditions. Reported health conditions included (any) respiratory (19%), hearing (65%), skin (20%), stress, sleep deprivation, or fatigue (47%), and musculoskeletal (59%) symptoms or conditions. Questions from the Nordic Musculoskeletal Questionnaire (NMQ) were included in the survey. A high prevalence of musculoskeletal discomfort (59%) was reported at all body sites combined; most frequently in the lower limb (35%), lumbar (26%), shoulder (23%), and upper limb (17%) areas; the frequencies are shown in more detail in Figure 2. Risk factors for (any) musculoskeletal condition were analyzed. After adjusting for age, sex, and operator status; high stress level, sleep deprivation, and exhaustion/fatigue showed strongest associations with (any) musculoskeletal discomfort with the odds ratios ranging from 4.7 to 5.6. Forceful exertions, repetitive tasks, awkward postures, frequent manual labor, and vibration were also significantly associated with musculoskeletal discomfort at all sites with the odds ratios ranging from 1.8 to 2.7. Recommended preventive techniques (regular breaks, stretching, exercising, good lifting techniques, and mechanizing work tasks) were not protective for musculoskeletal outcomes.
Publications – Surveillance Project Year 3


Presentations – Surveillance Project Year 3


Jadhav, Rautiainen. Oral presentation. Injury Risk Factors to Farm and Ranch Operators in the Central U.S. June 25, 2019 at the ISASH Annual Conference, Des Moines, IA.

Evaluation || Dr. Mary Cramer

Project Aims

- Assess the effectiveness of CS-CASH leadership and governance,
- Conduct quality assurance by tracking CS-CASH Logic Model Activities, Outputs, and Intermediate Outcomes, and
- Evaluate CS-CASH Logic Model End Outcomes for social and economic impacts.

Governance Evaluation. The Evaluation Team recently completed governance evaluation for FY8. The ICE© Instrument was administered in spring 2019 to quantify members’ ratings of CS-CASH leadership effectiveness (survey response rate 68%). We conducted follow-up field interviews with new pilot investigators (N = 5) to collect data on governance strengths and areas for improvement.

Partnerships in Evaluation. The Evaluation Team has received several requests to use CS-CASH developed methodologies and instruments (i.e., ICE©, Population-based Outcome and End Result Evaluation Survey, Project Scoring Instrument) from external researchers across the US, including from other Ag Centers. The evaluation team continues participation with the Ag Centers Evaluator, Coordinator and Outreach (ECO) bi-monthly phone conference meetings to benefit our efforts with resources and shared learnings about evaluation practices. An Ag Center evaluator meeting is scheduled for March of 2020 and the evaluation team plans to attend.

Social Network Analysis. We developed an innovative new Social Network Analysis (SNA) Survey in collaboration with Dr. Kirk Dombrowski and Dr. Patrick Habecker at the University of Nebraska Lincoln Department of Sociology. The survey purpose was to understand information diffusion across stakeholder networks that involve CS-CASH. Findings will be used to strengthen our ability to move Ag health and safety information out to our intended End Users, as identified in our CS-CASH Logic Model. The survey was administered in spring 2019 and had a 46% response rate.
response rate (155/333). Analysis of our network density, k-cores, betweenness centrality, and diversity were created in diagrams.

Development of Project Scoring Matrix. The Evaluation Team collaborated with Dr. Fernando Wilson, Professor of Health Economics, University of Utah and our CS-CASH leaders to finalize the CS-CASH Project Scoring Matrix. The instrument provides a weighting and ranking of valued outcomes and serves to quantify annual and long-term goal achievements. It also is the basis for our Social Return on Investment (SROI) analysis FY 9.

To generate our baseline scores for FY7, we collected data from multiple sources. FY7 scores were 75/79 or 95% (overall Center) and 78/102 or 76% (funded projects). Areas for improved goal achievement included peer reviewed publications, oral presentations and securing grant funding. Center leadership determined that efforts will be focused on increasing publications and presentations from each 4 or 5 year funded investigator along with forming or expanding community and research partnerships.

Publications/Presentations


Cramer, M. Wendl, M. Wilson, F. Rautiainen, R. Measuring Effectiveness and Economic Impact of a Federally Funded Agricultural Safety and Health Center. APHA to be held in November 2-6, 2019

Pilot Project Program || Dr. Eleanor Rogan

An essential program within CS-CASH is the Pilot Program that supports pilot and feasibility projects, with the goal of enabling investigators to collect preliminary data to support 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/or feasibility projects funded from this Center will result in subsequent grant submissions to NIOSH or other funding agencies to advance agricultural health and safety research.

The projects selected for support by this program must address a critical issue in agricultural safety and health and clearly lead to future, more extensive study of the selected critical issue. In the first eight years of funding, CS-CASH has funded 47 pilot projects with funds from the CS-CASH NIOSH Agricultural Forestry and Fishing grant and funding from the University of Nebraska Medical Center Office of the Vice Chancellor of Research. Using data generated from these projects, investigators have generated $9,826,045 in additional funding (Figure 1).

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Projects Funded Fiscal Years 1-8. (Ongoing projects highlighted.)

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<td>Grain dust exposure in the allergic lung</td>
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<td>Murray Madsen</td>
<td>Rural Roadway Safety: Collisions between Motor Vehicles and Farm Equipment on Rural Roadways</td>
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<td>Matthew Beacom</td>
<td>Ag Health NE: novel preventive health services model for NE farm families</td>
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<td>Joseph Siu</td>
<td>Effects of Sleep Deprivation on Balance, Stress, and Recovery Among Farmers</td>
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<td>Y1</td>
<td>Chandran Achutan</td>
<td>Preventing Hearing Loss Among Farmers by Point-Source Hearing Protection Strategy</td>
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<td>Y2</td>
<td>Kathy Morris</td>
<td>Prevention and Treatment of Agricultural Respiratory Disorders: A Pilot Educational Program for Rural Health Care NPs and PAs</td>
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<td>Name</td>
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<td>Y2</td>
<td>Gretchen Mosher Mosher</td>
<td>Pre-Professional Perceptions of Safety and Quality Concerns in Agricultural Work Environments</td>
</tr>
<tr>
<td>Y2</td>
<td>Kay Slama</td>
<td>Development of a multi-state capacity to disseminate and evaluate the efficacy of a web-based stress-management program for agricultural producers</td>
</tr>
<tr>
<td>Y2</td>
<td>Jason Stratman</td>
<td>Imminent hazards in English and Spanish</td>
</tr>
<tr>
<td>Y3</td>
<td>Carol Anderson</td>
<td>AMH Ag Safety Program</td>
</tr>
<tr>
<td>Y3</td>
<td>Lea Pounds</td>
<td>Community Driven Solutions to Address Farm Injuries</td>
</tr>
<tr>
<td>Y3</td>
<td>Derry Stover</td>
<td>Nebraska Pesticide Poisoning Surveillance Review and Outreach</td>
</tr>
<tr>
<td>Y3</td>
<td>Gordon Moore</td>
<td>New Feedyard Hire Safety Orientation</td>
</tr>
<tr>
<td>Y4</td>
<td>Jill Poole</td>
<td>Mechanisms Underlying Inhalant Agriculture Organic Dust Exposure-Induced Systemic Bone Loss</td>
</tr>
<tr>
<td>Y4</td>
<td>Carolyn Sheridan</td>
<td>Lungs for Life</td>
</tr>
<tr>
<td>Y4</td>
<td>Kelley Donham</td>
<td>CSF national sustainability</td>
</tr>
<tr>
<td>Y4</td>
<td>Athena Ramos</td>
<td>Health &amp; Job Hazards of Latino CAFO Workers in Missouri</td>
</tr>
<tr>
<td>Y4</td>
<td>Clayton Kelling</td>
<td>Best Practices for Range Bison</td>
</tr>
<tr>
<td>Y5</td>
<td>Stephanie Leonard Brandi Janssen</td>
<td>Farmer Evaluation of Agricultural Fatality Messaging; Best Practices for Disseminating Prevention Messages Based on FACE Cases</td>
</tr>
<tr>
<td>Y5</td>
<td>Jill Kilanowski</td>
<td>Safety in the Agricultural Work Camp, Comic Book Developed and Evaluated for Latino MSAW Families</td>
</tr>
<tr>
<td>Y5</td>
<td>Paula Schulz</td>
<td>Cardiovascular Disease Risk and Physical Activity in Farmers</td>
</tr>
<tr>
<td>Y5</td>
<td>Kristina Bailey</td>
<td>Hyper-inflammatory responses to organic dust exposure in the elderly</td>
</tr>
<tr>
<td>Y6</td>
<td>Kristi Warren</td>
<td>Contributions of Allergic versus Non-allergic Lung Injury with Ag Exposure to Bone loss</td>
</tr>
<tr>
<td>Y6</td>
<td>Joseph Siu</td>
<td>Development of a mobile application for agricultural safety, AgrSAFE</td>
</tr>
<tr>
<td>Y6</td>
<td>Laura McDougall</td>
<td>Creating Healthier Agricultural Communities</td>
</tr>
<tr>
<td>Y6</td>
<td>Tonya Ford</td>
<td>United Support and Memorial for Workplace Fatalities</td>
</tr>
<tr>
<td>Y6</td>
<td>Jamie Arens</td>
<td>Navigating Cancer Prevention, Education and Detection for the Ag Worker</td>
</tr>
<tr>
<td>Y6</td>
<td>Bryan Weichelt</td>
<td>MAPPER Immersion: Developing an Augmented Reality prototype to Protect Lives …</td>
</tr>
<tr>
<td>Y6</td>
<td>Natalie Roy</td>
<td>Building Capacity for Nurse Practitioners to Advance Total Farmer Health</td>
</tr>
<tr>
<td>Y7</td>
<td>Josie Rudolphi</td>
<td>Identifying the sources of stress and prevalence of anxiety and depression symptoms among young farmers and ranchers in the upper and western Midwest</td>
</tr>
<tr>
<td>Y7</td>
<td>Hideaki Moriyama</td>
<td>Development of ion channel blockers for Influenza D Virus</td>
</tr>
<tr>
<td>Y5</td>
<td>Kelly Cochran</td>
<td>Evaluation of Medication-Related Agricultural Injury Among Missouri Farmers</td>
</tr>
<tr>
<td>Y7</td>
<td>Chris Blanke</td>
<td>Gathering Local Data and Building Ag Partnerships to Better Reach Ag Families</td>
</tr>
<tr>
<td>Y7</td>
<td>Bryant England</td>
<td>Agricultural and Occupational Exposures in US Veterans with Rheumatoid Arthritis and Associations with Disease Severity</td>
</tr>
</tbody>
</table>
### Active Pilot Project Reports

**Gathering Local Data and Building Ag Partnerships to Better Reach Ag Families**

**Chris Blanke**

The Specific Aims of this project are to:
- Obtain local data on the health and well-being of local farm families and workers at agricultural businesses.
- Build capacity to support the health, safety, and well-being of local farm families, through agricultural business partnerships.

Four Corners Health Department serves Butler, Polk, Seward, and York Counties in Nebraska. With the recent flooding, mental stress has increased for many individuals and businesses, especially for those farming or in agriculture-related businesses. A study from the University of Iowa found that factors such as poor access to care, isolation, financial stress, and physical pain from working long days, combined with life factors, put farmers at a higher risk for suicide.

The CS-CASH funded workshop hosted by Four Corners Health Department was held on June 25, 2019. The workshop, designed for local businesses, focused on creating mental health friendly workplaces. Employers, managers, wellness leaders, human resource staff, and others were encouraged to attend, so that they could be better equipped to address mental health-related issues in their

<table>
<thead>
<tr>
<th>Year</th>
<th>Name</th>
<th>Project Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2018-2019</td>
<td>Jana Davidson</td>
<td>Creating Enduring Resources for Farm Safety Education</td>
</tr>
<tr>
<td>2018-2019</td>
<td>Julie Rother</td>
<td>Project Blue Ribbon Outreach</td>
</tr>
<tr>
<td>2018-2019</td>
<td>Missy Berry</td>
<td>Investigation into the respiratory properties of snow molds</td>
</tr>
<tr>
<td>2018-2019</td>
<td>Christine Chasek</td>
<td>Investigating Opioid and Alcohol Risk and Misuse Among Rural Agricultural Workers</td>
</tr>
<tr>
<td>2018-2019</td>
<td>Katherine Schofield</td>
<td>Injury Prevention in Greenhouse and Nursery Workers Through Engineering Design</td>
</tr>
<tr>
<td>2018-2019</td>
<td>Carey Wheelhouse</td>
<td>Improving Ag Worker Health and Safety Awareness through multimodal, case-based Physician Assistant Education</td>
</tr>
<tr>
<td>2018-2019</td>
<td>Bethany Lowndes</td>
<td>Parkinson's Care for Nebraskan in Agriculture</td>
</tr>
</tbody>
</table>
workplace. Thirty-two individuals attended the workshop. All four counties from the Four Corners’ District were represented, as well as another local health department and school staff from outside the district. Speakers including Dr. Don Belau, Dr. Christine Chasek, and Brandy VanDeWalle. The topics included stress, substance use, suicide prevention, care for employees after a suicide death, and creating a mental health friendly workplace. Other topics included liability issues and policies.

Agricultural and Occupational Exposures in U.S. Veterans with Rheumatoid Arthritis and Associations with Disease Severity || Dr. Bryant England

Specific Aim 1. Characterize the associations between agricultural and occupational exposures with RA autoantibody and inflammatory cytokine expression in RA patients, stratifying by genetic background. Hypothesis:

- Inhalant lung exposures, including agricultural dusts, will be associated with higher rheumatoid factor, anti-cyclic citrullinated peptide antibody, and serum inflammatory cytokine expression. This finding will be independent of smoking history.
- Associations of inhalant lung exposures with RA autoantibody concentrations will be independent of smoking history and enhanced in those with HLA-DRB1 shared epitope alleles.

Specific Aim 2. Determine the association between agricultural and occupational exposures with disease severity and extra-articular disease features in RA patients.

- Hypothesis 3. Inhalant lung exposures, including agricultural dusts, will be associated with higher disease activity, poorer functional status, and the presence of extra-articular disease features independent of smoking history in RA patients.

We conducted a survey of US Veterans with rheumatoid arthritis assessing agricultural, occupational, and environmental exposures at participating Veterans Affairs Rheumatoid Arthritis Registry Sites (Birmingham, AL; Washington D.C.; Iowa City, IA; Philadelphia, PA; Pittsburgh, PA; Portland, OR; Salt Lake City, UT). After performing data cleaning of survey responses, we linked these survey responses to clinical and serologic data within the VARA registry and the VARA Lung Study and completed analyses evaluating the associations between agricultural and occupational exposures with RA severity factors and autoantibodies.
These findings were submitted and accepted for poster presentation at the 2019 American College of Rheumatology Annual Meeting. A manuscript is currently being drafted.

**RESEARCH FINDINGS**

Of 1566 registry participants mailed surveys, 797 returned completed surveys (50.9% response rate). Responders were older, more frequently white, less frequently current smokers, and had better disease activity and functional status. Self-reported occupational dust exposures were present in 67.6%, living or working on a farm in 44.8%, Agent Orange exposure in 29.2%, and military burn pit exposure in 18.6%. Military service periods between 1965-1973 were most common among those self-reporting burn pit exposure, with 19% serving during periods characterized by open-air burn pits on military bases. There were no significant associations between occupational dust, farm, or Agent Orange exposures with RA autoantibodies or disease severity. Self-reported burn pit exposure was significantly associated with anti-CCP positivity (odds ratio [OR] 2.22, 95% CI 1.23-3.99) and higher anti-CCP concentrations (log-transformed; $\beta$ 0.50, 95% CI 0.07-0.93) independent of tobacco use. In analyses stratified by SE status, these associations were limited to individuals with SE alleles. In models examining combined self-reported burn pit exposure and SE status, those with both risk factors demonstrated a substantially higher risk of anti-CCP positivity (OR 8.56, 95% CI 3.46-21.20) compared to either risk factor in isolation. Self-reported burn pit exposure was not associated with RF positivity, disease activity, or extra-articular disease.

**Presentations.**

- **Associations of Self-Reported Inhalant Exposures with Autoantibodies and Disease Severity in U.S. Veterans with Rheumatoid Arthritis.** Ebel, Poole, Thiele, Baker, Cannon, Gaffo, Kerr, Reimold, Richards, Schwab, Singh, Ascherman, Mikuls, England. Accepted for Poster Presentation at the 2019 American College of Rheumatology Annual Meeting, Atlanta, GA

- **Association of Agricultural, Occupational, and Military Inhalants with Autoantibodies and Disease Severity in U.S. Veterans with Rheumatoid Arthritis.** Lutt; Ebel, Poole, Thiele, Baker, Cannon; Gaffo; Kerr; Reimold, Richards, Schwab; Singh; Ascherman, Mikuls, England. Poster Presentation at the 2019 UNMC Summer Undergraduate Research Program Poster Session, Omaha, NE

- **Agricultural and Occupational Exposures in U.S. Veterans with Rheumatoid Arthritis and Associations with Disease Severity.** Bryant England, MD. Oral Presentation at the 2018 Veterans Affairs Rheumatoid Arthritis Registry Annual Meeting, Omaha, NE
ATV Aware || Susan Harris Broomfield

This pilot project’s aim was to gather data from Nebraska FFA teens regarding their behaviors while operating or riding ATVs using pre- and post-surveys with a short interactive session about proper behaviors and laws. Knowledge improvement and behavior intention data was collected, and approximately six months later, another survey determined if those learned behaviors had changed their actual riding habits.

Aim 1: Gather demographic, knowledge, and behavioral outcomes related to ATV use using a sample of youth through 10 FFA chapters in Nebraska.
Aim 2: Influence behavioral intentions of the individuals participating in ATV Aware education.
Aim 3: Influence actual behaviors of participants who complete the ATV Aware program.

A total of 294 FFA chapter members from 11 Nebraska FFA chapters participated in the T1 survey. The age range of participants was 12-21, with a majority ranging in age from 14-18. Most participants (60.3%) were male, while 39.7% were female. Most participants (79.1%) indicated they live in a rural area, and 72% reported their family owned an ATV. A total of 255 participants completed T2, and 83 completed T3. The T3 results showed positive behavior change in areas of not allowing passengers, wearing a helmet as an operator or passenger, not riding on pavement, and not riding on unfamiliar terrain.

RESEARCH FINDINGS

<table>
<thead>
<tr>
<th>Knowledge Questions</th>
<th>T1 Survey</th>
<th>T2 Survey</th>
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<tbody>
<tr>
<td>ATV designed for 1 person</td>
<td>31.8%</td>
<td>83.2%</td>
</tr>
<tr>
<td>Age 16 is appropriate age</td>
<td>72.3%</td>
<td>97.2%</td>
</tr>
<tr>
<td>Not safe on pavement or gravel</td>
<td>40.2%</td>
<td>96.8%</td>
</tr>
<tr>
<td>Helmet most important gear</td>
<td>93.8%</td>
<td>97.2%</td>
</tr>
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<table>
<thead>
<tr>
<th>Behavior Questions</th>
<th>T1 Survey</th>
<th>T3 Survey</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do not allow passengers</td>
<td>20.1%</td>
<td>24.2%</td>
</tr>
<tr>
<td>Never ride on gravel</td>
<td>3.3%</td>
<td>0%</td>
</tr>
<tr>
<td>Drivers always wear a helmet if available</td>
<td>7.1%</td>
<td>18.8%</td>
</tr>
<tr>
<td>Never drive on pavement</td>
<td>33.2%</td>
<td>36.4%</td>
</tr>
<tr>
<td>Never drive on unfamiliar terrain</td>
<td>29.9%</td>
<td>39%</td>
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</table>
Feedback from the pilot project was crucial in determining changes to curriculum, and materials development for ongoing ATV Aware education. Through June 30, 2019, the program and ATV Simulator traveled to 86 events in four states, achieving over 12,500 face-to-face contacts. Events included education for 11 FFA chapters, agriculture safety days for children or teens, health fairs, school visits, employee education, conferences, outdoor sporting expos, farm expos, FFA state and national conventions, county fairs, and 4-H camps.

Creating Enduring Resources for Farm Safety Education || Jana Davidson

Since 1995, the Progressive Agriculture Safety Day® program has been on a mission “To provide education, training and resources to make farm and ranch life safer and healthier for children and their communities.” Our project, Creating Enduring Resources for Farm Safety Education, aimed to do just that. Our digital resource collection helped bring blueprints and designs to life, guiding visual learners in observing the process and assembly of teaching tools first-hand.

Project specific aims:

- Identify and recruit individuals that have created unique and effective props for use in farm safety and health education. Create videos of these individuals assembling their props from start to finish. Create videos that meet the needs of individuals with all learning types, including visual, auditory and kinesthetic.
- Allow access to videos to all interested individuals who are currently involved with teaching farm safety.
- Promote these resources by marketing the videos to Progressive Agriculture Safety Day® coordinators and presenters, agriculture teachers and FFA advisors, 4-H educators and volunteer leaders, and others invested in farm safety and health education.

Our initial goal of creating 10 videos emerged into a series of more than 25 video assets thanks to the generosity of in-kind donations of time and other services from valued colleagues and partners invested in agricultural safety and health. Additional funding sources allowed us to promote our project throughout North America at various conferences and conventions. The videos focus on one of the following elements: how to build a prop for a safety demonstration, how to utilize existing props for safety demonstrations, where to locate materials or where to purchase materials to build a prop, how to use the prop to teach a hands-on activity or demonstration to youth between the ages of 4 and 13.
This project was completed with the assistance and collaboration with many colleagues who are invested in agricultural safety and health. Partners include Asmark Institute, CHS, Scott Archer - videographer, Amy Rademaker of Carle Foundation Hospital, Jane Graves and the USDA Illinois Farm Service Agency, Dr. Laura Rice, formerly of the University of Kentucky, and Dr. Aaron Yoder and Ellen Duysen, both of the University of Nebraska Medical Center.

**Green Cross Award for Safety.** On May 16, 2019, the Progressive Agriculture Safety Day® program was named the recipient of the National Safety Council’s prestigious Green Cross Award for Safety Advocate. During the application process, the Creating Enduring Resources for Farm Safety Education project was the primary focus.

**Presentations.**

- CS-CASH External Advisory Board Meeting held in Omaha, Nebraska (May 16, 2018)
- International Society of Agricultural Safety and Health (ISASH) Conference in Halifax, Nova Scotia (June 22-26, 2018)
- Midwest Rural Agricultural Safety and Health (MRASH) Conference in Council Bluffs, Iowa (November 28-29, 2018)
- National Association of Farm Broadcasters (NAFB) Trade Talk in Kansas City, Missouri (November 8, 2018)
- National Association of Agricultural Educators Conference (NAAE) in San Antonio, Texas (November 28-30, 2018)
- Feature in DTN/The Progressive Farmer (November 2018 and January 2019 issues)
- 2019 International Society of Agricultural Safety and Health (ISASH) Conference in Des Moines, Iowa (June 24-28, 2019)
- Presented to 500 Lead & Assistant Progressive Agriculture Safety Day® Coordinators at Trainings (October 1, 2018 – March 1, 2019)

The completed collection of videos can be located on the Progressive Agriculture Foundation YouTube channel. Link to the videos: [https://www.youtube.com/playlist?list=PLyxOQ5fgytC-XaesE8lxy74y6NyssJecW](https://www.youtube.com/playlist?list=PLyxOQ5fgytC-XaesE8lxy74y6NyssJecW)
In 2018, the Northeast Nebraska Public Health Department (NNPHD) surveyed the area agricultural population to ask them what their preferred method of contact in the event of a public health emergency is as well as their input on health and safety needs of their community. The survey was distributed via postcards at community events, area businesses, the NNPHD Facebook page and website and via email. A total of 135 surveys were returned.

Findings from the needs survey were disseminated to the community.
Investigation into the respiratory properties of snow molds || Missy Berry

Specific Aims
We are testing the hypothesis that snow mold associated species incite pathogenic pulmonary responses in animals and that seasonal changes contribute to the immunogenic properties of the fungal species using the following specific aims:

- To isolate and identify environmental fungal isolates and the effect of seasonal changes on their ability to cause disease. We will conduct environmental sampling at various regions in the area at different times of the year to isolate microorganisms present. We will identify fungi from environmental samples and look for commonalities within these groups.
- To determine the extent to which environmental fungal isolates instigate respiratory immune responses. We will use in vivo modeling in the mouse to test our working hypothesis that fungal species associated with snow mold cause respiratory distress, including epithelial disruption resulting in local trauma and allergic sensitization.

Seasonal mold allergies are not typically associated with very early spring weather. As such, the spores of the psychrophilic fungal species that grow and attack dormant plants while under snow cover are not reported in air quality monitoring. Even though overwhelming anecdotal evidence shows an impact on human and animal health, the vast majority of the research on snow molds is focused on plant pathology and reduction of mold in the field and grasses of lawns and turf. These fungi are certainly pathogens of economic importance to the state of North Dakota (ND) where prolonged snow cover provides a dark, humid environment that is optimal for the fungi to thrive, infecting barley and hard red winter wheat, as well as winter-harvested corn, all of which are major crops of the region. However, they may also be pathogens of humans, with agricultural workers having a particularly acute exposure to their spores in spring planting season especially. Until we understand the prevalence and immunopathology of snow molds, we will fail to understand the potential health impacts that they have on agricultural workers and the public.
RESEARCH RESULTS – YEAR 1

We were able to isolate and identify three species of fungi from an agar plate placed in a residential lawn; Aspergillus fumigatus, Cladosporium cladosporioides, and Penicillium glabrum. Environmental sampling is ongoing, in order to collect samples during harvest time in the region. DNA will be extracted from the environmental sampling and sequenced to identify additional candidates for in vivo testing.

The three fungal species initially identified have been used in an in vivo murine model to test if they are able to elicit an immune (inflammatory) response. Lung tissues, blood, and lung lavage samples were taken from the animals one day after exposure to one of the fungal species, via four weekly intranasal administrations of the organisms. RNA was extracted from the lung tissues and qPCR was performed to assess the differences, if any, in gene expression when compared to that of a naïve animal. Interferon gamma and interleukin-1, both inflammatory cytokines, were upregulated in all test groups when compared to naïve animals. Additionally, interleukin-33, a potent inducer of TH2 response, was also upregulated in the test groups. Further testing is currently ongoing to test for protein production via ELISA and histological staining of lung tissues.

Presentation.

Injury Prevention in Greenhouse and Nursery Workers through Engineering Design Innovation || Dr. Katherine Schofield

The goal of this study is to examine injury risk to nursery and greenhouse workers and to design and implement an engineering intervention to reduce risk in this population, with the following specific aims:

- Evaluate comparative risk factors for injury and severity based on worker, job, and injury event characteristics, including text narratives.
- Determine areas of high injury prevention priority and engineering design feasibility
- Innovate and test efficacy of an engineering intervention to prevent a high priority nursery industry injury using a contextual design approach

A total of 61 greenhouses were surveyed:

- 1229 injuries - overall injury rate of 4.9 per $1million of payroll,
- Lost time - 13.5%
- Workers under age 30 - 37%
- Women 29% of injuries
- High-severity injuries: moving and loading trees, erecting and maintaining greenhouses, and material handling.
- Frequent injuries involved: hand tools, material-handling, hand-digging, lifting/moving equipment, and operation of motorized vehicles.
- Ergonomic, material handling and lifting-related injuries caused the largest percentage of injuries (38%).
- Tool and equipment-related causes resulted in 9% of total injuries.
An undergraduate mechanical engineering senior design team (4 students) had a prevention-through-design project focus. We deployed the team, graduate student, and faculty to a recruited industry partner host-site. Hazards, challenges, and potential solutions were noted during multiple site visits. Twenty-two employees were interviewed (English and Spanish) to determine their concerns and injury risk factors. Projects were selected based on host-site injury data analysis, on-site observations, and staff interviews, coupled with the following ranking criteria: likely to use; saves time; injury frequency/severity reduction; cost; ease of implementation; timeframe; impact (time used/people); reduces ‘touches’ ($0.16 a touch); client priorities; worker priorities.

Two projects were selected to reduce worker risks and fit within the 3-month timetable of the summer semester: repetitively punching holes in hanging basket pots with unsafe equipment; and the repetitive lifting and carrying methods of plant inventory movement on greenhouse tables over uneven surfaces and narrow walking paths. The team designed, prototyped, and tested solutions specific to these problem areas, developing a plant pot hole-puncher (hole-puncher) and a greenhouse plant transport cart (cart). The hole-puncher eliminated electrical hazards, unguarded moving parts, and dust generation. The new, manual design improved ergonomic positioning and reduced force/grasp requirements, and reduced hole-generation from 14 seconds to ~2 seconds. The cart makes table loading/unloading tasks easier by reducing strain, fatigue, and lifting demands on staff members. Additionally, the cart allows for a greater number of plants to be transported simultaneously (10/12 versus 6/7). Together, these factors should improve navigation of walkways between tables and reduce risk of strain, trips, falls and contusions and lacerations caused by collision with the tables.

These solutions have been implemented into practice and post-intervention data will be collected. Engineering solutions/prototypes may have a wider industry translation to other agricultural operations; intellectual property has been applied to both products through the University of Minnesota.

Presentations.
Poster Presentation: Injury and Severity in Greenhouse and Nursery Workers: Can Data Drive Prevention Through Engineering Design? Western Regional Ag Safety and Health Conference, Seattle, WA August 7-9, 2019

Lightning Talk-Oral Presentation: Injury and Severity in Greenhouse and Nursery Workers: Can Data Drive Prevention Through Engineering Design? Western Regional Ag Safety and Health Conference, Seattle, WA August 8, 2019
Parkinson’s Care for Nebraskans in Agriculture || Dr. Bethany Lowndes

Project Aims:
- Evaluate Parkinson’s disease signs and disease prevalence in the agricultural community.
- Identify user requirements for rehabilitation engineering and adaptive technology to enable individuals with Parkinson’s disease to complete agricultural tasks safely.
- Explore novel modes of early Parkinson’s disease deterioration monitoring for feasibility in the agricultural community.

Parkinson’s disease significantly impacts daily life and work ability for over 4,000 individuals in Nebraska. Agricultural workers may be at an increased risk for Parkinson’s disease compared to the general population. While symptoms can be treated to improve daily living, there are limited options to provide safe work adaptations for agricultural workers with Parkinson’s disease.

We have developed and deployed a survey to inquire about early symptoms of Parkinson’s disease. Along with olfactory screenings, surveys were administered to 20 individuals at a Nebraska agricultural event called Husker Harvest Days. Data are being prepared through the Department of Health and Human Services (DHHS) to provide information on occupation for individuals included in the state Parkinson’s disease registry in order to determine what proportion of individuals included in the registry report an agricultural occupation. Death Certificates have been reviewed for 5,819 individuals with Parkinson’s disease revealing 97.8% live in rural areas.

We are working with AgrAbility, an organization that assists farmers and ranchers with disabilities and debilitating diseases in the processes of identifying and obtaining assistive technologies. They have conducted occupational assessments with clients diagnosed with Parkinson’s disease. This collaboration will support the upcoming focus groups and interviews with farmers, ranchers, and individuals with Parkinson’s disease to define user requirements for safe working environments. Additionally, AgrAbility is interested in work to monitor disease progression and predict the need for modification.
Improving Agricultural Worker Health and Safety Awareness through Multimodal, Case-Based Physician Assistant Education || Carey Wheelhouse

Specific Aims

- Increase Physician Assistant (PA) student awareness of agricultural health and safety issues
- Increase PA student medical knowledge regarding agricultural health and safety issues
- Emphasize and enhance communication skills with agricultural patients
- Increase health care access in agricultural communities

The UNMC Division of Physician Assistant Education is working to improve health outcomes of patients in Midwest agricultural communities.

After completion of their classroom learning and simulation activities, PA students will build upon their foundation of agricultural patient care through a 12-week, rural clinical rotation. Students complete an initial survey of their agricultural health knowledge and communication skills prior to their classroom learning and simulation activities. Students will complete the same survey after their classroom and simulated learning phase and then again after their hands-on clinical experience.

During their clinical learning phase, selected students with a high interest in agricultural medicine careers will have the opportunity to attend the annual Midwest Rural Agricultural Safety and Health Conference. Interested students completed an essay outlining their career interests in Agricultural Medicine, stating how the conference would pertain to their future education and career goals. Students will attend the conference through grant funding.

After completion of clinical learning and final survey data collection, the investigators will assess data for agricultural health and safety knowledge improvement, as well as increased confidence in communication skills over the course of the student learning modalities. Investigators will also look for factors associated with intent to work in a rural and/or agricultural community, using the data for continuous assessment and enhancement of agricultural health and safety curriculum.

PA PROGRAM UPDATES

PA students learn agricultural health content through traditional classroom learning, handouts, small group case-based learning and simulated encounters that assess their communication skills, physical exam interpretation and knowledge. New lecture material includes:

- respiratory disease secondary to dust inhalation,
- chemical exposures, and
- noise-induced hearing loss.
Evaluation of Medication-Related Agricultural Injury among Missouri Farmers || Dr. Kelly Cochran

This project aims to determine the extent to which farm-related injuries that result in hospital admission or emergency department visits are associated with drug-related problems in the farmers’ home medication regimen and to characterize and measure the frequency of drug-related problems.

A student researcher collected medication-related problems from the medical record for cases of farm injury resulting in a hospital admission or emergency department visit. A clinical pharmacist is reviewing data collected for accuracy.

Home medications are a component of the questions asked upon entry to the Level 1 Trauma Center and serve as a jumping off point to evaluate for medication therapy problems or medication taking behaviors that may have been present at the time of the farm injury.

The comparison group of farmers in the community, who have not experienced a farm injury resulting in hospital admission or emergency department visit, are being recruited through advertisements located in rural clinics/pharmacies, MU Extension newsletter, and at state and regional county fairs. A recruitment mailing to Missouri farmers is in progress to complete the data collection. A revised project timeline was granted and the project is progressing.
Emerging Issues || Dr. Risto Rautiainen

Project Aims

- Examine trends and identify emerging issues affecting the health and safety of farmers, ranchers, family members and agricultural workers. CS-CASH identifies emerging issues from monthly injury and fatality case reports from the Center’s media monitoring service, annual data from the Center's injury surveillance project, reviews of the literature, and case reports from a network of experts in the field.
- Respond to identified emerging issues without delay by investigating the problems and solutions and communicating preventive information to the affected populations and stakeholders. CS-CASH prepares and delivers coordinated evidence-bases responses to identified emerging issues. The program also funds small grants to outside entities that are in position to respond. Proposals can be submitted at any time. The Center Director and the Pilot Projects Program team evaluate the proposals and issue expedited funding decisions.

Emerging Issue Funded Projects

Respiratory Fit Test Workshops - Train the Trainer – Ag Health and Safety Alliance

Using emerging issues funding, the Train the Trainer Fit-Testing Program was developed in partnership with the Ag Safety and Health Alliance after concerns by pesticide certification trainers that fit testing, as required by the Worker Protection Standard, was not readily available.

This program, targeted to health care and safety professionals, and Extension educators, provides the information and resources needed to conduct respiratory fit testing in agricultural communities.

The training includes education on how to integrate fit testing into an organization’s business model. This information is valuable to public health departments and rural clinics, demonstrating that while providing this service to agricultural workers an organization can develop a revenue stream.
Telling the Story Project

Narrative is perhaps the most basic mode of human interaction, and a fundamental way of delivering knowledge. Narratives have been shown to influence attitudes and change behaviors. US Agricultural Safety and Health Centers including the Great Plains Center for Agricultural Health (GPCAH), the Upper Midwest Agricultural Safety and Health Center (UMASH), the Central States Center for Agricultural Safety and Health (CS-CASH) and the National Farm Medicine Center are collaborating on a translation activity to convey the story of agricultural safety. While statistics and numbers are important to identify injury trends and emerging issues related to workplace health and safety, Telling the Story Project (TTS) takes a closer look, creating injury prevention messages that highlight personal stories based on first-hand experiences.

Research indicates that farmers are more open to safety messages after reading about a traumatic farm incident and that farmers generally consider other farmers and agricultural publications to be trusted sources of information. Telling the Story Project helps agricultural workers, and all who have been impacted by fatal and non-fatal agricultural workplace injuries (workers, family and community members), share their stories. Told in their own words, their experiences teach about what went wrong, and how to prevent or avoid similar incidents. A website has been developed as a platform for the personal narratives and a monthly rural radio program is being developed as a means to effectively deliver this content.

The Website. www.tellingthestoryproject.org

Examples of “Telling the Story” narratives are shown below.

Kenny
When the ATV tipped, he knew the outcome would be bad. He heard his thigh bone snap when 700 pounds of equipment rolled over him. Read more...

David
“How did you ever survive this?” was the question David Endorf’s neighbors asked when they saw where he was pinned under an ATV in a steep ditch. Endorf explains what...

Mike
“Live today like you are going to die tomorrow, but farm today like you are going to farm forever.” Mike Bidasz loved farming. Read more...

The process.

Plans and work for TTSP are discussed during bimonthly teleconferences and biannual face to face meetings.
Prospective stories are identified through word of mouth, news articles and individual storytellers contacting the team.

TTSP team members conduct interviews in person, on site and by phone. Interviews may include videotaping. Storytellers review and approve the final content of edited stories and videos.

Important prevention messages and “lessons learned” are included in each story to assist readers to identify the best practices to work safely. Relevant links to safety and health resources are included on story pages.

Student lesson guides are developed for stories. These guides provide talking points and questions related to specific stories, allowing agricultural educators to use content from this site for safety and prevention training.

**The Target Audience.**

While Telling the Story intends to reach a wide audience, our stories’ target audience includes: producers, families, and employees working in agriculture; agricultural media and mainstream press; ag educators and students and; Extension specialists

**Initial Impact**

Storytellers indicate that having the opportunity to share their experience to help others has been a positive experience. A survey of the storytellers is planned that will determine personal impact and feedback related to the storytelling process.

The Telling the Story Project website has had 14,238 page views.

Stories beget stories. TTS stories shared on social media prompt additional sharing and relaying of similar incidents and cautionary advice.

Our stories have been featured in SafetyWatch columns of Iowa Farmer Today affiliated publications, weekly print agricultural media publications that reach over 84,000 households in the Midwest, and online at www.agupdate.com.

Telling the Story Project news articles shared through the Associated Press have reached over 900,000 viewers through out the United States.

Stories published in partnering agricultural media have consistently ranked in the top 5 most popular online articles of the week.

Preliminary review by regional agricultural media publishers and Wisconsin vocational ag instructors has been enthusiastic and positive, with teachers indicating intended use in fall 2018 curriculum.
Outreach Program || Dr. Debra Romberger

Project Aims

- Integrate information from the Center’s Research, Evaluation and Pilot Program projects, as well as information from external sources, translating it into a coordinated outreach effort and effectively disseminate the information using a wide range of proven methods.
- Develop and launch radio social marketing campaigns, innovative training webinars and eHealth web-based toolkits targeted to women in agriculture and to military veteran farmers.
- Support and advance current information technology efforts that disseminate occupational safety and health information and education to workers, managers, educators, researchers and health and safety professionals in the agricultural industry.
- Identify, evaluate and disseminate new technology products and applications to workers, managers, educators, researchers and health and safety professionals in the agricultural industry through crowdsourcing and citizen science.

Outreach Audience. In 2018 and 2019 the CS-CASH Outreach Program continued a coordinated outreach strategy directed at audiences that include agricultural producers, with a focus on women working in agriculture young workers, grain handlers, and health, and safety professionals.

In partnership with the Grain Handling Safety Coalition and Sukup Manufacturing, CS-CASH provided OSHA grain safety training to 142 FFA students who attended Husker Harvest Days in 2019.
Partnerships. The Outreach Program is strengthened by working in partnership with members of the AgriSafe Network, USDA Extension, National Agricultural Safety Database, Ag Health and Safety Alliance, Grain Safety Handling Coalition, Farm Bureau, agriculture-related journals and rural newspapers, women in agriculture organizations, agri-insurance agencies, media organizations, members of the agricultural community and close collaboration with other NIOSH funded Agricultural Centers.

Translational Outreach. CS-CASH works with the Center’s research teams and partners to effectively translate research to outreach in the areas of pulmonary disease, feedyard safety, immigrant worker health, surveillance findings and emerging issues.

Emerging Issue Outreach. The Outreach team continues to use the Center’s vast surveillance database to detect emerging issues, allowing a rapid response to immediate concerns affecting the agricultural community. CS-CASH has responded to health and safety concerns including: the Avian Influenza outbreak, aflatoxin contamination in corn, increases in heat stress and fire dangers, and most recently the 2019 devastating flooding that has affected many farms and ranches across the Midwest.

2019 Midwest flood response. In partnership with University of Nebraska Medical Center, Map International and Agrisafe, CS-CASH delivered over 2500 Safe Flood Recovery kits to farmers, ranchers and rural community members. Center personnel produced a just in time webinar in collaboration with AgriSafe and 7 press releases related to safe farm and ranch recovery were sent to news media across the Midwest.
Examples of articles generated because of press releases sent to Midwestern media outlets following the 2019 flooding. To date there have been approximately 276 CS-CASH produced flood-recovery stories and interviews run in newspapers, on electronic media, on radio and television.

Social Media and Electronic Outreach. The Center creates content for distribution, including internet-based applications; print and radio media; in order to access farm families and workers on more than 500,000 farms and ranches in our Center’s region. Our comprehensive 27,000-member database made up of farmers and ranchers, public health officials and safety and health professionals has provided an effective method to reach farmers and ranchers with information on emerging issues as well as with other safety and health information. The CS-CASH website was accessed 7918 times in this reporting year. Social Media including Facebook (522 followers) and Twitter has proven to be successful in reaching audiences throughout the year with information on emerging issues as well as general safety and health information. The CS-CASH Ag Safety and Health Photo Sharing site provides agribusiness, the media and safety professional images for use in the promoting safe practices with over 1300 copyright free images. The Feedyard Safety Photo Album contains 340 images.

CS-CASH Facebook: https://www.facebook.com/unmccscash/
CS-CASH Website: https://www.unmc.edu/publichealth/cscash/
CS-CASH Photo Sharing Site: https://www.flickr.com/photos/cscash/
CS-CASH Twitter @UNMC_CSCASH
**Boots on the Ground.** Face-to-Face outreach continues as an effective method for the Center to demonstrate, train and discuss proven safety and health measures.

**Tractor and Equipment Safety Training and Certification.** In collaboration with the University of Nebraska – Lincoln Extension, CS-CASH presented tractor and equipment safety training at 12 locations across Nebraska in the summer of 2019. This two-day certification training graduated 143 students, many of whom, upon completion, began working on farms and ranches. In addition to extensive experiential learning about the safe operation of tractors, ATVs and equipment, students receive training on the proper use of PPE. A local EMT presented emergency medical response training, providing the students with life-saving information. PhD and MPH graduate students from the UNMC College of Public Health assist with the trainings. The trainings received extensive media coverage at all the 12 sites, including TV interviews and numerous news articles many highlighting the hazards related to tractor rollovers. [https://www.theindependent.com/news/tractor-safety-courses-planned-across-nebraska/article_30ae63f6-5e7d-11e9-ae65-43f1bcbe184e.html](https://www.theindependent.com/news/tractor-safety-courses-planned-across-nebraska/article_30ae63f6-5e7d-11e9-ae65-43f1bcbe184e.html)

In addition to classroom learning, students attending the 2-day tractor and equipment safety course gain hands-on experience while learning safe practices for hitching and towing implements and driving tractors and ATVs.
Cross-Center collaboration.
Members of the Outreach Program participated in calls and subgroups of the NIOSH AFF Evaluator, Coordinator, and Outreach (ECO) team.

CS-CASH members participate in the leadership of the USAg Centers YouTube group. This has proven to be a successful collaboration between all 11 NIOSH Agricultural Safety Centers. The YouTube channel features 117 videos, produced and peer-reviewed by the Ag Centers including 9 produced by CS-CASH. The channel has had over 370,000 watch time minutes since its inception in 2013. [https://www.youtube.com/user/USagCenters](https://www.youtube.com/user/USagCenters)

CS-CASH has joined forces with other NIOSH AFF Centers - Great Plains Center for Agricultural Health and the University of Minnesota Agricultural Safety and Health Center as well as AgriSafe and the Iowa Department of Public Health to exhibit and present trainings at the Farm Progress Show (IA), Husker Harvest Days (NE), Triumph of Ag (NE), Lake Region Extension Roundup (ND) and the FarmFest (MN). Conducting collaborative outreach brought diverse topics, trainings and expertise to these events.
Midwest Rural Agricultural Safety and Health Conference. CS-CASH cohosted the annual MRASH conference along with the Great Plains Center and ICASH November 2019. As part of this conference, CS-CASH partnered with Dan Neenan (Peosta, IA) to present a hands-on anhydrous rescue and safety training to 30 rural firefighters in Treynor IA (pictured below) and to 25 Farmer's Coop employees in eastern Nebraska.

National FFA Convention. In partnership with CareerSafe Online, CS-CASH took part in the Safety Exhibit at the National FFA Convention in Indianapolis IN., October 2018. Hearing conservation and ATV safety were the topics of discussion. Over 2500 students took part in the dual trainings over a 3-day period.

Western Agriculture Safety and Health Conference. CS-CASH partnered with the Washington, Colorado, Texas and California NIOSH Agricultural Centers to plan and present the Western Ag Safety and Health Conference August 7-9, 2019. CS-CASH members participated on the planning committee and are coordinating and editing A special Conference edition of the Journal of Agromedicine. This edition will be published in summer 2020.

Safety and Health Training Course. The 2019 annual weeklong Agricultural Safety and Health Course took place at UNMC College of Public Health with 23 students attending. From 2011 to 2019,
171 course participants have received training as well as academic and continuing education credits. Participants include rural health care professionals, veterinarians, public health professionals and students. Experts in the fields of agricultural and occupational medicine, farm safety and agricultural engineering teach the sessions. The course includes training in respiratory fit testing and a farm tour. The evaluations for this course have been very good. The 2020 course is scheduled for July 14-17, 2020.

**Face to face demonstrations, presentations and materials distribution.** CS-CASH outreach personnel participated in agricultural farm shows and agribusiness events in the Center’s seven state region. Outreach took place at Husker Harvest Days (NE), FFA Conventions (NE, IA, IN), Custom Harvesters Convention (KS), Triumph of Ag (NE), AgConnect (MO), Women in Agriculture Conferences (NE, IA, MO); Veterans in Agriculture (KS), Farmfest (MN), Sustainable Ag Conference (SD) and Lake Region Extension Roundup (ND). CS-CASH provides training and demonstrations at these events, interacting with up to 500 people/day at some of the larger events. This Boots on the Ground outreach, reaches large numbers of farmers and ranchers in all seven of our regional states, encourages long-term community relationships to flourish and valuable new relationships to be established. New focus topics are presented each year.
Spanish Language Agricultural Safety and Health Resources. CS-CASH continues to work to translate all of their educational resources into Spanish. These materials are available to the public at farm shows, trainings and on the CS-CASH website: 


Ag Media. Ag journalist Loretta Sorensen continues to create media-ready, Ag safety and health related stories for the Ag and rural newspapers, farm journals and radio and television stations. Story content is created using experts in the field with the final copy reviewed by two content experts. UNMC Public Relations and Loretta disseminate the articles through Midwestern media sources and the Associated Press. These articles are available to the media and to the public on the CS-CASH website as “Ag Stories Ready to Go”. UNMC supports a news-tracking service that provides metrics including the source running the article/interview, date, frequency, circulation, article size, ad value and page number. Link: https://www.unmc.edu/publichealth/cscash/news/index.html.

Citizen Scientist Initiatives.

Hearing Conservation Project. In this reporting period, participants from 4 FFA groups (2 NE, 2 IA) took part in a hearing conservation citizen scientist project. Students received an hour-long presentation from CS-CASH personnel on prevention of hearing loss. Following the presentation, each student received a pair of Ryobi noise suppressing earphones and instruction on use. Information on the earphones. Students were asked to record noise in their work (farm/shop) environment using the earphones and the App and to keep a record of how long they were exposed to the noise. The recordings and notes were then sent as wave files to CS-CASH. A graduate student is currently analyzing these data as part of their Capstone work.

Heat and Humidity log for women working in agriculture. A citizen scientist project testing the usability and feasibility of a device called the Kestral Drop is underway. The Kestral Drop monitors and records temperature, and humidity and determines a temperature humidity index alerting a worker to unsafe conditions. Women working in agriculture will be recruited from three Midwest States to take part in the citizen science project looking at heat exposure and need for monitoring.

National Ag Safety Database (NASD). http://nasdonline.org/

CS-CASH continues to support the maintenance, software updates and administration of the National Ag Safety Database. NASD has continue to grow with addition of training materials, videos and additional resources.
AgriSafe Network Outreach.
The AgriSafe Network continues to receive funding as part of the CS-CASH Outreach Program.

The AgriSafe Network is a non-profit national membership organization, which represents health professionals and educators who strive to reduce health disparities found among the agricultural community. We believe agricultural injuries, diseases, and fatalities can be prevented through the effective delivery of agricultural occupational health services. Although national in scope AgriSafe has a stake in CS-CASH and has invested and continues to invest in the service areas it serves.

Specific Aims: Women in Agriculture and Veteran (Active Duty, Reservists, Retirees)

Farmers
For each population conduct activities to yield the following:
1. Obtain local data on the health and well-being of local farm families and Ag businesses.
2. Build capacity to support the health, safety, and wellbeing of local farm families, through Ag business partnerships.

Women in Ag Outreach. The AgriSafe team provided education, resources, and training to producers, health professionals, and operators throughout the United States. AgriSafe reinforced its commitment to women who work in agriculture and expanded its footprint by training at over 15 Ag producer events in Iowa, Nebraska, and Missouri, and Wisconsin. Linda Emanuel, Community Health Nurse and Ag Producer, led the charge. Training on the use, fit and care of personal protective equipment was provided to women throughout the Midwest. AgriSafe expanded its dedication to the needs of women and secured a four-year federal training grant under the Occupational Safety and Health Administration. The funding CS-CASH lead to this advancement of women’s health training throughout the United States.

Addressing Extreme Weather. Extreme weather has become a focal point of our outreach efforts. Linda Emanuel, RN, AgriSafe Community Health Nurse and Ag producer located in North Bend, Nebraska, was put to task during the ‘Bomb Cyclone 2019’ weather event that impacted the Midwest. AgriSafe hired Linda, to be a grass roots advocate, partner, and organizer for states in the CS-CASH core outreach region.

Addressing Mental Health in the Agricultural Community. AgriSafe has been an organization known for responding to emerging issues and received funding from Farm Credit Council and CHS, Inc. to develop a national training series on mental health needs for primary care nurses and physicians that work in behavioral health shortage areas. A presentation on mental health in Ag producers was done at the National AgrAbility Training Workshop in Lincoln, Nebraska, in March 2019 with a follow-up webinar in June 2019. A key advisor in our mental health training efforts has been Dr.
Tina Chasek, Assistant Professor at the University of Nebraska at Kearney in the Department of Counseling and School Psychology and the Director of Behavioral Health Education Center of Nebraska -Kearney. AgriSafe Staff, Linda Emanuel and Knesha Rose-Davison also attended the Mental Health First Aid during the National AgrAbility Training Workshop in March 2019.

**Veterans Working in Agriculture.** AgriSafe Network conducted a virtual Think Tank on the role that rural healthcare providers could play in the improvement of the health of farmer military veterans. The presentation was marked by polling questions that gauged the attendees’ opinions and perspectives on the needs and health disparities of farmer military veterans. See the results from the Veteran Think Tank held May 29, 2019 [Veteran Think Tank Results- May 29, 2019](#).

![May 29, 2019 Virtual Think Tank Results](#)

**Outputs and Outcomes**

**Farm Flood Resource**

*Farm Flood Health Threats- Risk Factors during Winter Recovery*

In partnership with CS-CASH, the AgriSafe Network produced a cold weather “Farm Flood Health Threats” resourced. The flyer advises caution during flood recovery. Floodwater can be contaminated by pollutants including sewage, human and animal feces, pesticides and insecticides, fertilizers, oil, asbestos, rusting building materials, and others. Although public attention is focused on property loss caused by floods, protecting your own health is more important.
Outputs and Outcomes (cont.)

Women’s Health- Stories from the Field
Carey Portell- https://youtu.be/MtmBH1eb81c
Cindy Stockamp- In Progress (October 2019)

Yoga the AgriSafe Way

Media
Heart Health Information for female producers- FarmHer Blog, 02/14/19, Linda Emanuel
Encore! Mental Health- Shining Bright FarmHer Podcast- 05/22/2019, Linda Emanuel
Mom-to-Mom Are You OK? Mental Health Awareness month, postpartum depression for female producer- FarmHer Blog, 05/29/19 Linda Emanuel
Ohio Volunteers help Flooded Farmers in Nebraska Successful Farming- Cheryl Tevis 08/19/2019

A Focus on Wellness and Safety. FarmHerBlog, 09/09/2019 Linda Emanuel (NFSH Week)

Presentations
“Mindful Farming: Invest in Farm Safety and Your Health” - Executive Women in Ag, Chicago, Illinois (January 2019)
“Safety-Sensitive Occupations: Dangers with Opioid Use and Farming”- National AgrAbility Training Workshop (NATW) Lincoln, Nebraska (March 2019)
“Supporting Physical and Emotional Wellbeing for Rural Military Veterans” National AgrAbility Training Workshop (NATW) Lincoln, Nebraska (March 2019)
Webinar- “AgriSafe Think Tank: Improving the Health of Farmer Military Veterans” (May 2019)
“Empowering Farm Women to farm stronger- Building Resilience” ISASH Annual Meeting (June 2019)
“Optimizing the Health of the Female Producer” CS-CASH- UNMC AgriMedicine Course (July 2019)
“Paving the Road to Resilience-Mental Health Stress as Related to Disaster and Current Ag Climate” – Iowa Women in Ag (August 2019)
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CS-CASH Publications Fiscal Year 8


