



# GREAT PLAINS

## Center for Agricultural Health

Annual Report period: 9/30/2014 - 9/29/2015

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## SECTION I

### CENTER SUMMARY

The Great Plains Center for Agricultural Health (GPCAH) at The University of Iowa is a nationally recognized resource with an established record of developing and implementing programs of research, intervention, translation, education, and outreach to prevent occupational injury and illness among agricultural workers and their families. The Center addresses the health and safety needs of agricultural workers in the Midwestern states of Iowa, Missouri, Kansas, Nebraska, Illinois, Wisconsin, Minnesota, South Dakota, and North Dakota. These states constitute America's most agriculturally intensive region.

The overall goals of the Great Plains Center for Agricultural Health are to:

1. Conduct multidisciplinary research targeting national priorities for agricultural health and safety.
2. Develop and evaluate educational, outreach, and intervention programs to prevent disease, injury, and hazardous exposures among agricultural workers.
3. Serve as a national resource for delivery of agricultural health knowledge and expertise to industrial hygienists, epidemiologists, ergonomists, veterinarians, and physicians to enhance the national capacity to meet the agricultural health and safety needs.
4. Provide agricultural health and safety technical assistance and consultation to health and safety professionals, community-based agricultural health organizations, and agricultural producers .
5. Maintain and strengthen linkages with health professionals in academic institutions, state and federal agencies, and international organizations to promote agricultural health and safety efforts.

### RELEVANCE

Agricultural workers experience high rates of fatal and nonfatal occupational injury and illness when compared to other employed groups. As the region's most well-established agricultural health and safety resource, GPCAH activities are highly relevant to agricultural workers and their families, health department officials, community organizations, public health scientists, physicians, and researchers committed to protecting the health and safety of all persons engaged in agricultural work. Relevance is described by each project, below.

### KEY PERSONNEL

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### CENTER WEB LINKS

<http://CPH.uiowa.edu/GPCAH/>

<https://www.facebook.com/GPCAH>

## SECTION II

### PROGRAM HIGHLIGHTS OF HIGH IMPACT

#### Intervention to Reduce Aerosol Exposures in Confined Animal Feeding Operations (CAFOs) (R Anthony)

The focus of this project is to improve the air quality of swine CAFOs using standard mechanical ventilation methods that are typical of industries other than agriculture. High impact accomplishments for 2014-15 include (1) assessment of system performance from the 2013-14 winter deployment that used a filtration air pollution control unit; and (2) deployment and assessment of the system performance from 2014-15 winter using a cyclone unit. We completed the assessment of an intervention using new vented heaters to reduce carbon dioxide (CO<sub>2</sub>) concentrations in the farrowing room, which houses sows and young piglets.

In the first winter (2013-14), we found that operating the ventilation system (with the shaker dust filtration air cleaner) at 1000 cfm ventilation system reduced respirable dust (small particles) concentrations by 41% and inhalable dust (larger particles) by 33%. These decreases in dust concentrations were achieved without significantly increasing the concentrations of other gaseous compounds (ammonia, hydrogen sulfide) during the winter months. However, concentrations of CO<sub>2</sub> (mean 2480 ppm were elevated above target concentrations (1540 ppm is recommended for swine barn mixtures) and approached 50% of the regulatory limit for a single compound (2500 ppm) throughout the record-cold winter. A similar ventilation system was also deployed in 2014-15 winter, this time with a cyclone dust removal system replacing the filtration device. In addition, un-vented heaters, which are commonly used throughout the Midwest, were replaced with heaters that rerouted combustion gases to outside the building, in efforts to reduce CO<sub>2</sub>. The cyclone system reduced respirable dust concentrations by only 19% (substantially less than the filtration unit) but reduced inhalable dust by 30%. In addition, concentrations of CO<sub>2</sub> were significantly lower in this second winter (mean 1401 ppm), with the two new heaters in operation. However, the 2014-15 winter was warmer and had less sows and piglets in the farrowing room. Room concentration data were analyzed to estimate that the heaters contributed to a reduction of 800 ppm CO<sub>2</sub>, while the warmer outside temperatures and lower animal counts contributed to a reduction of 200 ppm between the two winter seasons. Since the new heater used in the intervention was only \$500 more than currently used heaters, a low-cost recommendation was made to replace heating units.

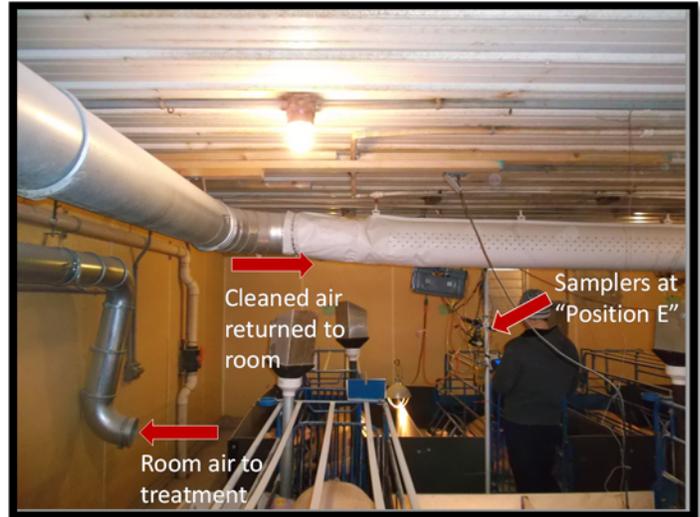


Figure 1: Ventilation ducts and sampler deployment inside farrowing room.

#### Farm Equipment Crash Study (M Ramirez)

This focus of this project is to provide important information (e.g., severity, location, environmental conditions) about farm equipment crashes and subsequent injuries throughout the region and to assess farm equipment lighting and marking policies to assess their effects on prevention. Crashes involving farm equipment are a persistent risk in the Midwest, and prevention efforts require an understanding of the patterns of these crashes and the development of effective interventions to reduce crash risks. This project involves a collaboration with the Department of Transportation Data to collect data on more than 7,000 crashes involving farm equipment (2005-2010) from nine Midwest states (IA, IL, KS, MN, NE, ND, SD, MO,

WI). One intervention approach - traffic legislation that requires lighting and marking of farm equipment – has not been rigorously evaluated.

High impact accomplishments for 2014-15 include 1) use of Geographical Information Systems (GIS) to collect detailed information about farm equipment crash location characteristics; 2) analysis of state policies on lighting and marking procedures and conformance to recommendations provided by the American Society of Agricultural and Biological Engineers Standards (ASABE); and 3) completion of a survey of farm operators regarding equipment use, driving, and prevention strategies.

We used GIS to determine the zip code where the farm crash occurred and to link to available census-based data. For example, Rural Urban Commuting Areas (RUCAs) were linked to each crash location by zip code to classify crash locations as ‘urban’, ‘large rural’, ‘small rural’, or ‘isolated rural’. We continue to look at environmental conditions (e.g., season, time of day, weather, and roadway characteristics) as potential determinants of crashes. In 2014-15, we found that, compared to level road surfaces, a road segment with a 6-10% gradient was associated with a 40% *decrease* in odds of a farm vehicle crash (OR=0.60, 95% CI: 0.49, 0.75). We also found that compared to a straight road segment (<1% sinuosity [i.e., ‘curviness’]) a road segment with 6-10% sinuosity was associated with a 62% *decreased* odds of farm vehicle crash (OR=0.38, 95% CI: 0.29, 0.52).

We also have developed a conformance score used to measure the extent to which state codes follow the ASABE standard recommendations. Illinois had the highest score of 30, while Missouri had the lowest score of 5. In seven states (excluding Illinois and Missouri), greater conformance to ASABE standards was associated with a significant reduction in farm equipment crash rates.

A survey of 1,667 farm operators across the region was completed in collaboration with the US Department of Agriculture’s National Agricultural Statistical Service. The survey included questions about miles driven, type of equipment operated, season, crashes and near misses on the road, and lighting and marking of farm equipment. Analysis is underway.



Figure 2: Farm vehicle on a rural road in Iowa.

### **Musculoskeletal Symptoms among Agricultural Workers (N Fethke)**

The focus of this project is to examine musculoskeletal symptoms and disorders among agricultural workers. This study provides new information about the physical demands experienced by agricultural workers while performing common tasks, and how forceful muscular exertions, awkward postures, repetitive activities, and whole-body vibration (WBV) are linked to the pain, injuries, and illnesses of agricultural workers. In particular, WBV measurements will provide a major contribution to the scientific and practitioner communities’ understanding of WBV and low back pain among agricultural workers.

High impact accomplishments for 2014-15 include: 1) completion all six rounds personal questionnaires by participating agricultural workers, 2) collection of on-farm measurements of exposure to physical stressors using a novel measurement system, and 3) measurement of WBV during operation of agricultural vehicles.

We have completed all repeated questionnaires (2 per year, 3 years) on agricultural workers enrolled in the study and are analyzing the responses. In a subgroup of workers who participated in these surveys, we have conducted field measurements to assess on-farm exposures to physical stressors (e.g., muscle activity, posture, and whole-body vibration) using a novel measurement system for directly measuring trunk angular displacement and upper arm elevation over prolonged work periods (8 hours). To date, we have obtained and processed representative measurements of WBV during operation of more than 75 agricultural vehicles and we are looking at the effects of vehicle type (e.g., combine, tractor, or utility vehicle), vehicle age, season of measurement (spring, summer, fall, or winter), and the presence of vibration dampening seats. Preliminary results suggest that older vehicles produce greater WBV in comparison to newer models and that WBV is highest during the winter months. We have also observed that the seats in utility vehicles (such as skid steer loaders and fork trucks) tend to amplify WBV exposure.



Figure 3: Measurement of WBV in a farm vehicle.

### **Advancing Research to Practice through Community Partners (F Gerr)**

The focus of this project is to strengthen the regional safety and health organizations that serve our nine-state region and to aid them in developing evidence-based agricultural health and safety services. The Center facilitates a two-way flow of information between agricultural producers and GPCAH staff.

GPCAH Project Leaders met quarterly with the GPCAH Regional Advisory Committee (RAC), a group of agricultural health and safety specialists from the nine-state region. At the annual in-person meeting in November 2014, RAC members helped us prioritize the needs of the agricultural community in the Midwest and analyzed GPCAH strategic planning activities. Teleconference meetings included discussions on collaborative approaches to outreach programming, successful strategies for direct outreach to agricultural producers, and ways to improve the two-way communication between the GPCAH and RAC member organizations.

We continue to foster communication and collaboration with other NIOSH Centers and state-funded centers:

- GPCAH project leaders have prepared monthly 'Safety Watch' articles for the Iowa/Illinois/Missouri Farmer Today magazine in collaboration with the Iowa Center for Agricultural Safety and Health (the state-funded I-CASH) and the Iowa FACE (NIOSH-funded fatality assessment and control evaluation program) personnel at the University of Iowa. This weekly magazine is distributed to more than 100,000 farm owners and operators, with on-line issues also available. In 2014-15, GPCAH worked with collaborators on seven articles covering topics such as ergonomics, hearing protection, hydrogen sulfide exposures, ammonia exposures, and injury prevention on the farm.
- The GPCAH solicits input quarterly from Regional Advisory Committee members, which includes representatives from neighboring NIOSH-funded [Central States Center for Agricultural Safety and

Health (CS-CASH, Omaha, NE) and Upper Midwest Center for Agricultural Safety and Health (UMASH, Minneapolis, MN)] as well as extension agents from Illinois, South Dakota, Missouri, Nebraska, and Kansas.

- During the summer of 2015, we collaborated with UMASH and CS-CASH to present agricultural health and safety exhibits at Minnesota Farmfest (Redwood Falls, MN) and Husker Harvest Days (Grand Island, NE).
- GPCAH co-sponsored the Midwest Rural Agricultural Safety and Health Conference (MRASH) in Ankeny, IA in November 2014. MRASH is the largest annual agricultural safety and health conference specifically targeting agricultural health issues in the upper US Midwest. This year, the conference focused on “Transforming Health and Safety in the Heartland” and was held in conjunction the Iowa Rural Health Association, providing health care providers with a new perspective on agricultural safety and health hazards in rural Iowa. Approximately 100 attendees participated in this two-day event.

The GPCAH website completed its conversion (to WordPress), improving its readability across multiple electronic platforms. It continues to be updated with news and “For Farmer” information to provide practical recommendations for hazard prevention. In 2014-15, we developed fact sheets for manure pit gas awareness and avian influenza PPE guidelines (see ‘Emerging Issues’) which are on the website. Press releases and direct contact with partners incorporate links to these fact sheets and alerts. Information from GPCAH as well as other NIOSH-funded Agricultural Health and Safety Centers are shared on GPCAH Facebook and Twitter accounts, with increased posting emphasis in February, 2015. We have seen increases in reaches per week over time (currently 265/week on Facebook) and will be analyzing impact of reach, by story type, over the last project year.

The Center continues to distribute a quarterly newsletter in which we disseminate practical, evidence-based information needed for prevention of agricultural injury and illness. The Alive and Well newsletter has a large distribution (2500 people) across the upper Midwest and is available in both electronic and print format. The most recent newsletter and an archive of past newsletters is available at: <http://www.public-health.uiowa.edu/gpcah/alive-and-well/>.

During 2014-15, we again provided direct and personal contact with agricultural producers through our “GPCAH - On the Go” campaign:

- GPCAH Staff traveled to over a dozen farm shows and county fairs in six Midwestern states to present hands-on demonstrations on hearing protection use, heat illness awareness, and safe play on the farm.
- The GPCAH outreach staff assisted with Progressive Ag Safety Days at the National Educational Center for Agricultural Safety and directed youth education programs at several county fairs and summer camps.
- Over 600 youth were educated on noise-induced hearing loss prevention through a multi-media curriculum and were given hearing protection for their personal use.
- A multi-faceted campaign, including a panel display, brochures, and individual education, was presented at regional farm shows to promote the use of hearing protection and other personal protective equipment (PPE) among agricultural workers. Approximately 700 farmers and ranchers received a PPE kit, containing ear muffs, several types of earplugs, and a pair of safety glasses, as they



Figure 4: 4-H Students playing "Heat Illness Jeopardy" at a county fair

worked with GPCAH staff to help us understand how PPE use can be increased on the farm/ranch. One-on-one coaching helped many realize how to properly insert expanding foam earplugs.

### **Building Capacity of Agricultural Safety and Health Specialists (D Rohlman, F Gerr)**

The Agricultural Medicine Core Course has been the national model of effective agricultural safety and health education since 1987, and was relaunched with funding from NIOSH in 2006 to expand beyond Iowa's borders. The focus of the course is to provide a strong foundation in the principles of agricultural safety and health for safety and health managers, graduate students, nurses, physicians, veterinarians, and anyone interested in the special health and safety needs of rural and agricultural communities. The annual delivery of the course at the University of Iowa continues to be well attended and is available for graduate college credit or Continuing Medical and Continuing Nursing Education Units.

The Agricultural Medicine Core Course, with assistance from GPCAH faculty and staff, has been delivered in Vermont, Nebraska, North Carolina, North Dakota, Wisconsin, Alabama, and Australia. The Course was delivered in Texas in 2014 as part of the Texas Rural Health Association annual meeting. Delivery of the course in each location includes the development of regionally specific agricultural health and safety content. Since 2011, the course has been delivered 21 times to a total of 453 trainees. We know of no other agricultural safety and health educational program with such a widespread geographical distribution.



*Figure 5: Building Capacity students at a grain storage safety training, June 2015*

Because the knowledge and skills needed by safety and health specialists is constantly evolving with changes in agricultural production practices, we continue to updating the course content and supporting curriculum. Partners with expertise in agricultural safety and health and agricultural production reviewed these revised course materials. In January 2015, we hosted a workshop at the University of Iowa, which brought together our partners offering the course in other states, to present the revised curriculum and discuss the sustainability of the course. The current revised curriculum has a greater emphasis on identification and mitigation of safety hazards and added emphasis on prevention of agricultural illness. In response to our stakeholder needs, we have begun to develop an online agricultural safety and health training module to increase distance learning opportunities.

### **Evaluation Program (E Parker)**

The Evaluation Coordinator, Marsha Cheyney, participated in numerous collaborative ventures with evaluation and outreach personnel from other NIOSH-funded Agricultural Safety and Health Centers this year. She leads the evaluation of the joint "US Ag Centers" YouTube channel, and is a member of the national Agricultural Safety and Health Awareness working group. She also participated in a meeting of evaluation and outreach personnel in June 2015.

The 2014-15 evaluation of the leadership and administration of GPCAH was conducted in two phases: a focus-group style discussion in conjunction with Center strategic planning activities and an individual survey of the internal advisory committee. This information led to efforts increase meaningful interactions with producers via a new outreach project and the creation of a more comprehensive Center communications plan.

To promote cross-Center collaboration in the evaluation of outreach activities, a new, survey-based reporting tool was created for the use of investigators and staff from GPCAH, Heartland Center for Occupational Safety and Health (ERC program), and the Healthier Workforce Center for Excellence (TWH program). This tool feeds into the database developed last year. It was piloted in April 2015, and has improved reporting efficiency for those involved in multiple Centers.

The evaluation team continues working with the outreach team to increase the Center's outreach efforts:

- Using results from the Farm Health and Safety Concerns survey conducted in 2014, a new outreach and evaluation project regarding hearing loss prevention (the second highest concern reported) was planned and implemented. This project increased the outreach staff's education efforts on the effective use of hearing protection during farming activities where hearing damage can occur. Nearly 700 hearing protection kits were distributed to farmers and ranchers across the GPCAH region, along with an assessment of current hearing protection use. Follow-up data collection and evaluation of this project are underway (through Dec. 2015).
- In-depth telephone interviews of the Regional Advisory Committee were conducted in Fall 2014. Analysis of this information identified three areas of potential collaboration to increase impact of outreach activities: 1) the creation and sharing of outreach materials between member organizations, 2) increased networking and collaborative outreach events, 3) the development of new regional training opportunities. Additionally, some member organizations expressed a desire for assistance in program evaluation.

This project year ended with a transition in Center leadership, and efforts to evaluate that process will occur in 2016.

### **Surveillance Program (C Peek-Asa)**

The surveillance program continues to provide partners with population-based information about trends in agricultural fatalities in the 11-state Midwest region and in non-fatal agricultural injuries for the state of Iowa. The data are acquired through an agreement with the Census of Fatal Occupational Injuries (CFOI). Ongoing analyses of the Iowa State Trauma Registry has helped identify unique trends and characteristics of non-fatal agricultural injuries. Very few states are equipped with an inclusive state trauma system, and even fewer indicate if an injury is work-related or agricultural-related. Each year, the findings are reviewed by the Bureau of Labor Statistics are freely disseminated to Center partners and are available to the public in a report and presentation on The GPCAH website.

During the period of 2005-2011, a total of 79,740 trauma patients were included in the Iowa Trauma Registry, of which 2,490 (3.1%) were designated as farm-related. Among these farm-related injuries, 51.7% were attributed specifically to work and the remaining 48.3% were non-work related. During 2002-2012, 513 nonfatal tractor-related injuries were identified in the Iowa Trauma Registry. 'Rollovers' were the most

frequent mechanism of injury (25%), followed by ‘Falls’ (20%) (Figure 6). ‘Run overs’, ‘Rollovers’, and ‘Collisions’ were significantly associated with higher injury severity. Compared to typical rural work injuries, agricultural injuries have longer periods in time from injury to time the injured person is discovered (e.g., ambulance is called), time to reach the hospital, and time to reach definitive medical care. Agricultural injuries that were treated at specialized acute care facilities (Trauma Level I, II and III hospitals) were also examined. During an eight-year period (2005-2013), there were significant increases in injuries from falls, transportation, machinery, and from natural and environmental exposures (e.g., heat).

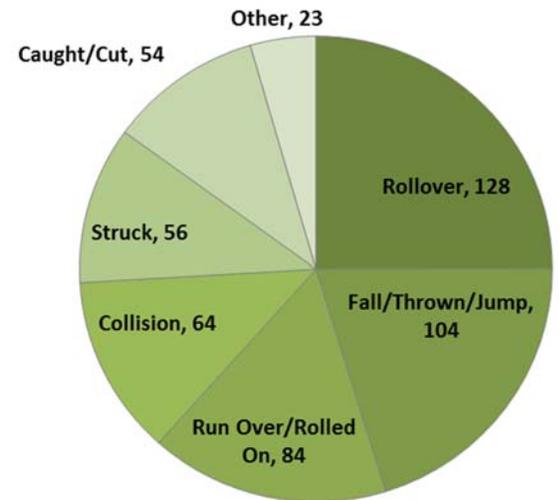


Figure 6: Nonfatal Tractor Injuries in Iowa, 2002-2012.

**Pilot Feasibility/Emerging Issues Program (F Gerr)**

This program is an incubator for new research, prevention, intervention, outreach, education, evaluation, and translation activities. In addition, it provides quick responses to emerging issues in agricultural health and safety. Highlights of these activities include responses to the Spring 2015 Avian Flu outbreak affecting the Midwestern poultry industry and to the multiple fatalities of livestock producers from manure pit gases. In addition, four pilot projects were funded to stimulate additional regional expertise in vulnerable populations (young farmers, Hutterite communities), basic science to understand microbiological risk factors (metagenomics and *Staphylococcus aureus* in livestock workers), and preventing injuries from new uses of consumer products for production farming (ATV Safety certification for farm family members).

**Emerging Issue: Avian Influenza**

In 2014-2015, GPCAH responded to the H5N2 highly pathogenic avian influenza (HPAI) outbreak, which affected over 48 million birds in the United States. In collaboration with regional partners including AgriSafe, the Central States-Center for Agricultural Safety and Health, and the Upper Midwest Center for Agricultural Safety and Health, a resource document outlining personal protective equipment (PPE) recommendations was produced for workers in poultry facilities. These recommendations were disseminated to all NIOSH Agricultural Safety and Health Centers and are now available from the Centers for Disease Control and Prevention at:

<http://www.cdc.gov/niosh/topics/avianflu/usresources.html>.

We also collaborated with the Southwest Center for Agricultural Health to provide personnel to conduct air sampling during the summer of 2015 during the handling of compost and mass disposal of turkey carcasses in Iowa. Preliminary data was gathered in order to determine workers’ inhalation exposure to hazardous gases, including ammonia, hydrogen sulfide, carbon dioxide, and carbon monoxide. These data demonstrated that the worker’s

**Avian Influenza**  
Personal Protective Equipment (PPE) Guidelines

**Avian Influenza Outbreak**  
The USDA Animal and Plant Health Inspection Service (APHIS) reported that between December 2014 and June 2015 the avian influenza (HPAI) H5 outbreak affected over 47 million birds in the US. The virus is spread through contact with fecal droppings, saliva and nasal discharges of infected birds. More information on avian influenza can be found on the [USDA website](#). The Centers for Disease Control and Prevention (CDC) has stated that "Although these viruses are not known to have caused disease in humans, their appearance might increase the likelihood of human infection in the United States." Anyone exposed to infected poultry should wear personal protective equipment (PPE). Anyone anticipating contact with infected birds or affected operations should consult the [USDA](#) and [CDC](#) websites. Sick birds or unusual bird deaths should be reported to State/Federal officials either through the state veterinarian or through USDA's toll-free number at 1-866-526-7593.

**Information provided is intended as general guidelines for exposures.**

**Respiratory Exposures**  
Working in affected poultry facilities involves exposure to dust, toxic gases and disinfecting chemicals, in addition to avian influenza virus. It is important to select respiratory protection for all of these exposures.  
**Avian influenza and particulates (dusts)** Appropriate protection for avian influenza and dusts is a NIOSH-approved particulate filtering respirator. Wear a particulate filtering respirator with an N95 or P100 filter or filter cartridge when working in poultry barns and when working with infected poultry and virus-contaminated materials or environments. Disposable 2-strip filtering face piece respirator masks (figure 1), half masks (figure 2) or full facepiece respirators with P100 filters.  
**Hazardous gases and vapors** are commonly found in poultry buildings. Ammonia levels may be high during manure and litter removal, building clean-out, and composting of carcasses and litter. Respiratory protection should include ammonia or multi gas cartridges approved for ammonia (shown in figures 3 and 4).  
**Cleaning and disinfecting compounds** contain ingredients that can be harmful to breathe. These may include aldehydes, ammonia compounds, acids, solvents and other ingredients. Read and follow product label guidelines regarding selection of the appropriate gas cartridges. Particulate filters should be used with these cartridges (shown in figures 3 and 4).  
**CAUTION:** Effective ventilation and use of respirators with multi gas cartridges and P100 filters are recommended when any of these gases and dusts may be present. A particulate filtering respirator with only an N95 or P100 filter or cartridge is effective for dust and viruses, but it does not protect against hazardous gases.  
**WARNING:** Use cleaning and disinfecting products only as directed. Some cleaning or disinfecting compounds may react with ammonia in litter to produce hazardous gases. Mixing cleaning or disinfecting products together can produce toxic gases. Consult the product label or manufacturer for additional information.

**Important Respirator Use Information**

- Consult a health care provider before wearing a respirator if you have a history of heart or lung disease.
- Respirators reduce exposure to airborne contaminants, but do not completely eliminate the risk of exposure, infection, illness, or death.
- Use respirators in accordance with manufacturer instructions.
- Information on respirator programs is available at [Local State Compliance Guide for the Respiratory Protection Standard](#).
- Improperly fitted respirators do not provide the intended protection. Respirators should be fit tested when possible. A user seal check (fit check) should be performed each time a respirator is worn. [Link to fit testing video](#).
- Maintain a clean shaven face to obtain the best fit and protection. A powered or purifying respirator (PAPR) with loose fitting face piece, hood or helmet can be worn by individuals with facial hair.
- See your health care provider for diagnosis and treatment if you experience respiratory symptoms (examples: shortness of breath, wheezing, cough, chest tightness) during or after working with poultry.
- For more information on respirator use in poultry facilities click - [Respirator Health on Poultry Farms](#).

**Availability of Personal Protective Equipment**  
Many stores and online vendors sell PPE. Prior to purchase, ensure that respirators are NIOSH approved and the correct type of PPE is used for the specific exposure. Further information can be found on the AgriSafe Network website [www.agrisafe.org](#). An online search for "PPE Safety Solutions" will list vendors of NIOSH approved respirators and other PPE.

Figure 7: Avian Influenza – Personal Protective Equipment (PPE) Fact Sheet

personal exposure to ammonia gases exceeded NIOSH and OSHA short-term exposure limits. This effort helped inform the PPE recommendations, above.

**Emerging Issue: Manure pit gas hazards**

In July 2015 the GPCAH responded to four fatalities in Wisconsin and Iowa resulting from gas exposures in swine barn manure pits. GPCAH developed guidelines for livestock producers to be aware of potentially fatal concentrations of manure gases and provided detailed guidance on how to monitor for manure pit gases. These guidelines were disseminated through representatives at the National Pork Board and the Iowa Department of Agriculture and Land Stewardship and are available on line. In August 2015, GPCAH provided hands-on demonstration and held discussions with producers at a livestock facility open house about the availability, types, and use of appropriate gas monitors to prevent future fatalities.

**Pilot Feasibility Program**

GPCAH continues to offer pilot funding to both community-based and academic organizations engaged in agricultural safety and health activities. Over this funding cycle, the GPCAH has funded a broad range of safety and health initiatives using the pilot grant funding (Figure 8). As a result of this funding, more than 1660 individuals across the region were trained in topics specific to farm safety, including grain handling or ATV/UTV safety. The majority of these trained individuals are adolescent farmers (515), adult producers (415), and farm family members (355).

Four new pilot projects were funded during the 2014-15 project year:

**1) Academic Project Title: Identifying Agricultural Behaviors of Iowa’s Young Farmers**

**PI:** Josie Rudolphi, PhD Student, University of Iowa, Department of Occupational and Environmental Health

**Co-Investigators:** Diane Rohlman, PhD, University of Iowa Department of Occupational and Environmental Health

**Aim:** This project seeks to characterize the safety behaviors that *young farmers* engage in while performing agricultural work. Safety behaviors and barriers to safe working habits were investigated in a survey of more than 200 young farmers.

**2) Academic Project Title: Metagenomics and Staphylococcus Aureus Colonization in Livestock Workers**

**PI:** Ashely Kates, PhD, University of Iowa Department of Epidemiology

**Co-Investigators:** Matt Nonnenman, PhD, University of Iowa Department of Occupational and Environmental Health; Tara Smith, PhD, Kent State University Environmental Health Sciences and Epidemiology; James Torner, PhD, University of Iowa Department of Epidemiology

**Aim:** This project aims to increase knowledge of the epidemiology of *Staphylococcus aureus* (*S. aureus*) colonization by performing a cross-sectional study of 60 livestock and crop farmers.

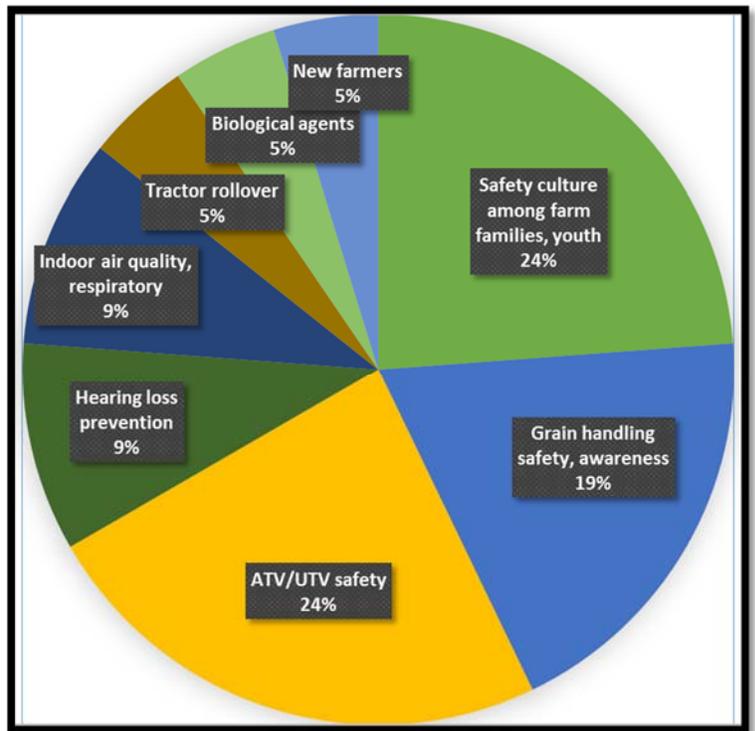


Figure 8: Pilot Project Topics, 2011-2015

**3) Community Project Title: Family ATV Safety Training**

**PI:** Joy Mortensen, North Dakota Farm Bureau ABC Farm Safety Coordinator

**Aim:** This project supports a 4-hour ATV Safety Certification course for 50 farm families in rural areas in North Dakota by partnering with the ABC Farm Safety program. Upon completion of the course, students receive formal certification and an ATV helmet (which are provided by sponsors from the local community).

**4) Community Project Title: Safe Farming, Safe Living: Educational Outreach to the Leut**

**PI:** Kerri Lutjens, RN; Melissa Gale, LPC MH; Avera St. Benedict Health Center, SD.

**Aim:** This project aims to present agricultural safety and health educational information and outreach to 10 Hutterite colonies near Parkston South Dakota in order to reduce injury and death from unsafe practices among colonies members.

## APPENDIX A

### GPCAH Outputs

October 2011 through September 2015

Great Plains Center for Agricultural Health	Y1 (2011 –12)	Y2 (2012 -13)	Y3 (2013 –14)	Y4 (2014-15)
Publications	12	8	7	21
Abstracts & Presentations	16	18	17	37
Lectures, Seminars, & Workshops	120	103	72	36
Consultations	8	24	14	3
Information to Policy Makers	3	6	5	11
Technical Reports	0	1	2	0
Press Releases & Media Stories	20	7	9	16

### Manuscripts Accepted for Publication

Anger WK, Elliot DL, Bodner T, Olson R, Rohlman D S, Truxillo DM, Kuehl KS, Hammer LB, Montgomery D. (2014). Effectiveness of total worker health interventions. *Journal of Occupational Health Psychology*. 20(2): 226-47. [PMID: 25528687]

Anthony TR, Park JH, Altmaier R, Peters TM. (2014) Modeled effectiveness of ventilation with contaminant control devices on indoor air quality in swine farrowing facility. *Journal of Occupational and Environmental Hygiene*. 11(7): 434-449. [PMID: 24433305]

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Rudolphi JM, Donham KJ. (2015) Toward a national core course in agricultural medicine and curriculum in agricultural safety and health: the "building capacity" consensus process. *Journal of Agromedicine*. 20(1): 77-83. [PMID: 25635745]

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Singleton ST, Lein PJ, Davidson OA, McGarrigle BP, Farahat FM, Farahat T, Bonner MR, Fenske RA, Galvin K, Lasarev MR, Anger WK, Rohlman DS, Olson JR. (2015) Longitudinal assessment of occupational exposures to the organophosphorus insecticides chlorpyrifos and profenofos in Egyptian cotton field workers. *International Journal of Hygiene and Environmental Health*. 218(2): 203-11. [PMID 25466362]

Swanton AR, Peek-Asa C, Young T. (2015). Characteristics of Agricultural Fatal Injuries by Production Type. *Journal of Ag Safety and Health*. In press.

Swanton AR, Young TL, Leinenkugel K, Torner JC, Peek-Asa C. (2015). Nonfatal tractor-related injuries presenting to a state trauma system. *Journal of Safety Research*. 53: 97-102. [PMID: 25934002]

### **Abstracts/Presentations Accepted for Scientific Meetings**

Anthony, Altmaier, Jones, Gassman, Sawvel, Peters. Evaluation of Air Quality Improvements in a Swine Farrowing CAFO. Midwest Rural Agricultural Safety and Health (MRASH) Conference, Ankeny, IA (November 19, 2014)

Anthony TR. Controlling exposure in CAFOs: An engineering approach. American Industrial Hygiene Conference and Exposition, Salt Lake City, UT (June 3, 2015)

Anthony TR. Using CFD to understand large particle inhalability. Oral Presentation (RT 218) American Industrial Hygiene Conference and Exposition, Salt Lake City, UT (June 2, 2015)

Butler-Dawson J, Thorne PS, Rohlman DS. Estimate Pesticide Exposure Among Children in Agricultural Communities and Examine the Impact on Neurobehavioral Function in Children. 13<sup>th</sup> Annual Midwest Rural Agricultural Safety & Health Conference, Ankeny IA. (November 2014)

Cassidy A & Cheyney M. U.S. Agricultural Safety and Health Centers YouTube Channel. 13th Annual Midwest Rural Agricultural Safety & Health Conference in conjunction with the Iowa Rural Health Association's Fall Meeting, Ankeny, IA (November 19, 2014)

Chen, Schall, Fethke, Oyama, Douphrate. Accuracy of inertial measurement units for wrist posture measurement. 13<sup>th</sup> Annual National Occupational Research Agenda (NORA) Young/New Investigators Symposium. University of Utah, Salt Lake City, UT (April 16-17, 2015)

Chen, Merlino, Branch, Schall, Gerr, Fethke. Seasonal effects of common farm tasks on the experience of low back pain. International Society of Agricultural Safety and Health Annual Conference. Bloomington-Normal, IL (June 21-24, 2015)

Douphrate, Fethke, Hagevort, Nonnenmann, Gimeno, Mixco, Marshall, Reynolds. Task-specific and full-shift sampling of upper extremity muscle activity among US large-herd dairy parlor workers. 7<sup>th</sup> International Symposium: Safety & Health in Agricultural & Rural Populations: Global Perspectives. Saskatoon, SK, Canada. (October 19-22, 2014)

Fethke. Associations between exposure to physical risk factors and musculoskeletal pain among agricultural workers. Occupational Hygiene in Agriculture – Roundtable Session. American Industrial Hygiene Conference and Exposition, Salt Lake City, UT (May 30 – June 4, 2015)

Harland KK, Ramirez MR. Prevalence of Alcohol Testing and Impairment in On-road Farm Equipment-Related Crashes (Oral); 40th Annual International Traffic Records Forum; St. Louis, MO (October 2014)

Hill and Aherin. Harness and Lifeline Use in Grain Bin Entry for Farm and Elevator Workers: International Society of Agricultural Safety and Health Annual Conference. Bloomington-Normal, IL (June 21-24, 2015)

Hill and Aherin. Harness and Lifeline Use in Grain Bin Entry for Farm and Elevator Workers. American Society of Safety Engineers Convention, Dallas, TX (June 7-10, 2015)

Jennissen, Harland, Winborn, Denning. ATV and UTV Safety Training for Agricultural Workers: A Safety Workshop Piloted with Iowa Farmers. National Occupational Injury Research Symposium. Kingwood, WV (May 19, 2015)

Jennissen, Harland, Winborn, Denning. Safety Training for Agricultural ATV and UTV Use. International Society of Agricultural Safety and Health Annual Conference. Bloomington-Normal, IL (June 21-24, 2015)

Jennissen, Harland, Winborn, Denning. ATV and UTV Safety Training for Agricultural Workers: Short Term Results of a Workshop Piloted with Iowa Farmers. Great Plains Society of Academic Emergency Medicine Meeting. Minneapolis, MN (September 19, 2015)

Khan K, Winborn A, Rohlman DS. Evaluation of Technology-based Interventions to Increase the Use of Hearing Protection Among Adolescent Farmworkers in Iowa. 13<sup>th</sup> Annual Midwest Rural Agricultural Safety & Health Conference, Ankeny IA (2014)

Missikpode C, Peek-Asa C, Young T. Trends in transportation farm-related injuries. 2015 Mid-Continent Transportation Research Symposium, Ames, IA (August 2015)

Olson JR, Abdel Rasoul G, Ismail AA, Hendy O, Hamad L, Singleton ST, Bonner MR, Khan K, Rohlman DS. Longitudinal Assessment of Exposures to Chlorpyrifos and Profenofos in Adolescent Egyptian Agricultural Workers. Society of Toxicology 54<sup>nd</sup> Annual Meeting, San Diego, CA (March 25, 2015)

Ranapurwala SI, Mello E, Ramirez MR. Effect of road characteristics on the incidence of farm vehicle-related crashes; 40th Annual International Traffic Records Forum, St. Louis, MO (October 2014)

Ranapurwala, Mello, Ramirez. Effect of road characteristics on the incidence of farm vehicle-related crashes. 142<sup>nd</sup> Annual American Public Health Association Conference; New Orleans, LA (November 2014)

Ranapurwala, Mello, Ramirez. Road segment characteristics and the incidence of farm vehicle-related crashes: A GIS based multistate matched case-control study. Society for Epidemiologic Research annual meeting. Denver, CO (June 2015)

Rohlman DS, Abdel Rasoul G, Ismail AA, Bonner M, Hendy O, Khan K, Olson JR. Exposures, Symptoms, and Neurobehavioral Performance: A Longitudinal Study of Adolescent Pesticide Applicators. 7<sup>th</sup> International Symposium: Safety & Health in Agricultural & Rural Populations: Global Perspectives, Saskatoon, SK, Canada (October 2014)

Rohlman DS, Shaw M, TePoel M, Huszar S. Occupational and Environmental Stress in Latino Agricultural Workers. 7<sup>th</sup> International Symposium: Safety & Health in Agricultural & Rural Populations: Global Perspectives, Saskatoon, SK, Canada (October 2014)

Rudolphi JM, Sheridan C, Rohlman DS. Agricultural Work Practices among College Students. 13<sup>th</sup> Annual Midwest Rural Agricultural Safety & Health Conference, Ankeny IA (November 2014)

Rudolphi JM, Ramirez M, Rohlman D. Decreased Income and Depression in Rural Women. 13<sup>th</sup> Annual Midwest Rural Agricultural Safety & Health Conference, Ankeny IA (November 2014).

Schall, Chen, Merlino, Gerr, Fethke. A prospective study of musculoskeletal symptoms among agricultural workers in the Midwest region of the United States. 7<sup>th</sup> International Symposium: Safety & Health in Agricultural & Rural Populations: Global Perspectives. Saskatoon, SK, Canada (October 19-22, 2014)

Schall, Fethke, Ramaswamy, Chen, Branch, Merlino, Watabe, Gerr. Whole-body vibration among agricultural workers performing common agricultural activities. International Society of Agricultural Safety and Health Annual Conference. Bloomington-Normal, IL (June 21-24, 2015)

Schneberger, DeVasure, Baily, Romberger, Wyatt. Effect of workplace CO<sub>2</sub> exposure limit levels on innate immune response to hog barn dust exposure. American Thoracic Society International Conference. Denver, CO (May 15-20, 2015)

Swanton AR, Young TL, Peek-Asa C. Non-Fatal Traumatic Injuries Associated with Tractors. Proceedings of the Midwest Rural Agricultural Safety and Health Conference; Ankeny, IA (November 19-20, 2014)

Swanton AR, Young TL, Peek-Asa C. Use of Emergency Medical Services among Farm-Related Injuries in Iowa. Poster session presented at: Medical Scientist Training Program (MSTP) I Heart Science Poster Session, University of Iowa; Iowa City, IA (February 19, 2015)

Swanton AR, Young TL, Peek-Asa C. Time to Definitive Care for Severely Injured Pediatric Patients in a Rural State. Poster session presented at: College of Public Health Research Week, University of Iowa; Iowa City, IA (April 7, 2015)

Swanton AR, Young TL, Peek-Asa C. Time to Definitive Care for Severely Injured Pediatric Patients in a Rural State. Poster session presented at: Pediatrics Research Day, University of Iowa; Iowa City, IA (April 17, 2015)

Swanton AR, Young TL, Peek-Asa C. Do Farmers Experience Delays in Reaching Definitive Trauma Care Following Occupational Injury? Poster session presented at: Health Sciences Research Week, University of Iowa; Iowa City, IA (April 22-24, 2015)

Swanton AR, Young TL, Peek-Asa C. Use of Emergency Medical Services among Farm-Related Injuries in Iowa. Poster session presented at: Iowa Medical Society Annual Conference; Cedar Rapids, IA (May 2-3, 2015)

Swanton AR, Young TL, Peek-Asa C. Time to Definitive Care for Severely Injured Pediatric Patients in a Rural State. Poster session presented at: National MD/PhD Student Conference; Keystone, CO (July 17-19, 2015)

TePoel M, Shaw M, Huszar S, Rohlman DS. Correlates of Mental Health in Seasonal Farmworkers. 13<sup>th</sup> Annual Midwest Rural Agricultural Safety & Health Conference, Ankeny IA (November, 2014)

Toussaint M, Smith K, Ramirez MR. Characteristics of farm equipment crashes involving youth occupants; 40th Annual International Traffic Records Forum; St. Louis, MO (October, 2014)

Williams S, Farnell M, Tabler T, Nonnenmann M. The Effects of a Sprinkler Cooling System on Dust Concentrations in Broiler Chicken Production. International Society of Agricultural Safety and Health. Normal, IL (June 21-24, 2015).

Young T, Ranapurwala SI, Ramirez MR. Epidemiology of farm equipment crashes in nine Midwestern states. 40th Annual International Traffic Records Forum (Oral); St. Louis, MO (October, 2014).

### **Lectures or Seminars Delivered at the University of Iowa**

Anthony TR. (2014): Lectures: delivered to graduate OEH students for Occupational Health (OEH:5600, 12 students, 2 lectures).

Anthony TR (2015): lectures on Agricultural Safety and Health to 20 graduate students in Rural Health and Agricultural Medicine course (OEH:6110, 3 hours).

Anthony TR (2015): "Occupational Safety and Health in Agriculture" to 25 agricultural health professionals in Building Capacity – Agricultural Medicine course (1.5 hour).

Anthony TR (2015): "Transportation Hazards in Agriculture" to 25 agricultural health professionals in Building Capacity – Agricultural Medicine course (1 hour).

Anthony TR (2015): lectures on Ag topics in Quantitative Exposure Assessment to 7 graduate students in Quantitative Exposure Assessment course (5 hours).

Fethke N (2015). "Ergonomics in Agriculture" to 25 agricultural health professionals in Building Capacity – Agricultural Medicine course (1.25 hours).

Gerr F (2015). "Occupational Diseases of the Lungs in Agricultural Settings" to 25 agricultural health professionals in Building Capacity – Agricultural Medicine course (1.5 hours).

Gerr F (2015). "Occupational Skin Disorders in Agriculture" to 25 agricultural health professionals in Building Capacity – Agricultural Medicine course (1.25 hours).

Gerr F (2015). "Musculoskeletal Disorders Among Agricultural Workers" to 25 agricultural health professionals in Building Capacity – Agricultural Medicine course (1.25 hours).

Gerr F (2015). "Cancer Among Agricultural Workers" to 25 agricultural health professionals in Building Capacity – Agricultural Medicine course (1 hour).

Leonard S (2015). "Iowa FACE Program agricultural fatalities" to 25 adults in the Building Capacity – Agromedicine course (1 hour).

Janssen B (2015). "Livestock Production" to 25 agricultural health professionals in Building Capacity – Agricultural Medicine course (1.5 hours).

Leonard S (2015). "Ag Fatalities and Injuries" to 25 students at Kirkwood Community College.

Leonard S (2015). "Ag Fatalities and Injuries" to 15 graduate students.

Neenan D (2015). "Agricultural Injury" to 25 agricultural health professionals in Building Capacity – Agricultural Medicine course (2 hours).

Neenan D (2015). "Safety and Rescue Demonstrations" to 25 agricultural health professionals in Building Capacity – Agricultural Medicine course (2 hours).

Nonnenmann M (2015). "Physical Agents/ Use and Selection of Personal Protective Equipment" to 25 agricultural health professionals in Building Capacity – Agricultural Medicine course (2 hours).

Rohlman D (2015) Seminar: "Rural Health and Agricultural Medicine" 175:209 to 14 graduate students (42 lectures).

Rohlman D (2015). "Overview of Agricultural Safety and Health" to 25 agricultural health professionals in Building Capacity – Agricultural Medicine course (1 hour).

Rohlman D (2015). "Case Study: Youth in Agriculture" to 25 agricultural health professionals in Building Capacity – Agricultural Medicine course (0.5 hour).

Rohlman D (2015). "Case Study: Agricultural Environmental Health Issues" to 25 agricultural health professionals in Building Capacity – Agricultural Medicine course (0.75 hour).

Rohlman D (2015). "Pesticide Exposures and Associated Health Effects" to 25 agricultural health professionals in Building Capacity – Agricultural Medicine course (1.5 hours).

Rohlman D (2015). "Behavioral and Emotional Health" to 25 agricultural health professionals in Building Capacity – Agricultural Medicine course (2 hours).

Rohlman D (2015). "Prevention of Agricultural Injuries and Illnesses" to 25 agricultural health professionals in Building Capacity – Agricultural Medicine course (1 hour).

### **Workshops, Seminars, Lectures Conducted by GPCAH Personnel in the Agricultural Community**

Bucklin R, Cheyney M (2015) Workshop on Heat Illness prevention at Camp Clover, Elmwood, IL. Presented to 25 children.

Bucklin R, Cheyney M (2015) Workshop on Hearing loss prevention at Camp Clover, Elmwood, IL. Presented to 25 children.

Cheyney M (2015) Workshop on Hearing Loss prevention at a Progressive Ag Safety Day at the National Education Center for Agricultural Safety in Peosta, IA. Presented to 133 elementary and high school students.

Cheyney M (2015) Workshop on Hand Hygiene on the Farm at a Progressive Ag Safety Day at the National Education Center for Agricultural Safety in Peosta, IA. Presented to 100 elementary and high school students.

Cheyney M (2015). Training on Heat Illness Prevention given to 200 migrant agricultural workers in Williamsburg, IA.

Fethke N (2015). "The right tool for the job... and you." Presented to 30 community members in Ames, IA (2 contact hours).

Hill and Aherin (2014) "Harness and Lifeline Use in Grain Bin Entry for Farm and Elevator Workers: Train the Trainer," Bloomington, IL.

Hill and Aherin (2015) "Harness and Lifeline Use in Grain Bin Entry for Farm and Elevator Workers: Lifeline Training," Grain Operations Conference and Entrapment Prevention Symposium, Bloomington, IL.

Hill and Aherin (2015) "Harness and Lifeline Use in Grain Bin Entry for Farm and Elevator Workers: Lifeline Training," Farm Progress Show, Decatur, IL.

Nonnenman M (2015). "Occupational Hygiene in Agriculture." Coordinated round table at AIHce (#235) in Salt Lake City, UT (June 3, 2015). Estimated 50 attendees in 3.5 hour session.

Nonnenman M (2015). "Occupational Hygiene in Animal Production Agriculture: New Approaches." Coordinated round table (#247) at AIHce, Salt Lake City, UT (June 4, 2015). Estimated 50 attendees, 3.5 hour session.

Peek-Asa C(2015). "Trends in Non-Fatal Agricultural Injuries in Iowa." Presented to 20 Community members in Grinnell, IA (1.5 contact hours)

### **Consultation or Information Exchange**

Anthony TR and Gibbs J (2015). Provided information to producers during Amana Farms Open House, specifically addressing instrumentation to provide hydrogen sulfide alerts from manure pit gases. (August, 8, 2015)

Cheyney M (2015). Information Exchange "Heat illness prevention for kids resources" with a County Extension agent.

Leonard S (2015). Information Exchange "Agritourism Safety" with 10 producers in Donnellson, IA.

### **Information Provided to Policy Makers**

Anthony TR and Rohlman D (2015): NIOSH AFF activities to protect Iowa Farmers. Discussions with Iowa representatives sharing GPCAH activities to support Iowa farmers. September 23 and 24.

Jennissen C (2015): Recreational Off-Highway Vehicle Exposure, Safety Behaviors, and Crash-Related Injuries: Testimony on behalf of the American Academy of Pediatrics. Oral Presentations Regarding the Recreational Off-Highway Vehicles Notice of Proposed Rulemaking. US Consumer Product Safety Commission Public Meeting. Bethesda, MD.

Ramirez M (2014). Road characteristics and incidence of farm vehicle crashes. Given to 30 members of the State Traffic Records coordinating committee

Ramirez M (2014). Farm vehicle-related crash study in nine states: 2005 – 2010. Given to 18 Representatives of Departments of Transportation (DOT) of Iowa, Kansas, North Dakota, Nebraska, Minnesota, and Missouri.

Ramirez M (2014). Epidemiology of farm equipment crashes in nine Midwestern states. Given to 18 Representatives of Departments of Transportation (DOT) of Iowa, Kansas, North Dakota, Nebraska, Minnesota, and Missouri.

Ramirez M (2014). Characteristics of farm equipment crashes involving youth occupants: One pager. Given to 18 Representatives of Departments of Transportation (DOT) of Iowa, Kansas, North Dakota, Nebraska, Minnesota, and Missouri.

Ramirez M (2014). Lighting and marking legislation to prevent farm equipment crashes on the road: one pager. Given to 18 Representatives of Departments of Transportation (DOT) of Iowa, Kansas, North Dakota, Nebraska, Minnesota, and Missouri.

Ramirez M (2014). Prevalence of Alcohol Testing and Impairment in On-road Farm Equipment-Related Crashes: One pager. Given to 18 Representatives of Departments of Transportation (DOT) of Iowa, Kansas, North Dakota, Nebraska, Minnesota, and Missouri.

Ramirez M (2014). Not just a rural occurrence: Farm Equipment-related Crashes: One pager. Given to 18 Representatives of Departments of Transportation (DOT) of Iowa, Kansas, North Dakota, Nebraska, Minnesota, and Missouri.

Ramirez M (2014). Effect of road segment characteristics on the incidence of farm vehicle-related crashes: One pager. Given to 18 Representatives of Departments of Transportation (DOT) of Iowa, Kansas, North Dakota, Nebraska, Minnesota, and Missouri.

### Press Releases and Media Stories

Anthony TR (2014) "New Iowa Model Weighs up Farrowing Room Ventilation Options". The Pig News website at <http://www.thepigsite.com/swinenews/34243/iowa-model-weighs-up-farrowing-room-ventilation-options>.

Anthony TR (2014) "Simulation of Air Quality and Cost to Ventilate Swine Farrowing Facilities in Winter". American Association of Swine Veterinarians at <https://www.aasv.org/news/story.php?id=6741>.

Anthony TR (2015) "Heaters in Agricultural Buildings" *Farm Families Alive and Well* newsletter (21):4.

Gerr F, Fethke N (2015) "Oh My Aching Back" Iowa Farmer Today (Jan 9, 2015), [http://www.iowafarmertoday.com/news/crop/oh-my-aching-back/article\\_6b410164-976b-11e4-8bda-63c3690d3e58.html](http://www.iowafarmertoday.com/news/crop/oh-my-aching-back/article_6b410164-976b-11e4-8bda-63c3690d3e58.html).

Gerr F (2014) "Stay Safe When Using Pesticides" *Farm Families Alive and Well* newsletter (20):2.

Gerr F (2014) "National Farm Safety and Health Week September 21-27" *Farm Families Alive and Well* newsletter (19):4.

Gerr F, Leonard S (2015) "Safety Watch: Hearing Protection never too early or too late." Iowa Farmer Today (May 27, 2015) [http://www.iowafarmertoday.com/news/safety-watch-hearing-protection-never-too-early-or-too-late/article\\_d914e694-d4bd-11e4-9095-271313a2e75c.html](http://www.iowafarmertoday.com/news/safety-watch-hearing-protection-never-too-early-or-too-late/article_d914e694-d4bd-11e4-9095-271313a2e75c.html)

Hakes D (2015) "Pediatric ER doc patiently pushes ATV safety." Iowa City Press Citizen. Sept 4, 2015. <http://www.press-citizen.com/story/news/2015/09/03/pediatric-er-doc-patiently-pushes-atv-safety/71646520/>

Leonard S (2015) "Hearing Assistive Devices and Protection." Iowa Farmer Today, March 27, 2015. [http://www.iowafarmertoday.com/news/safety-watch-hearing-protection-never-too-early-or-too-late/article\\_d914e694-d4bd-11e4-9095-271313a2e75c.html](http://www.iowafarmertoday.com/news/safety-watch-hearing-protection-never-too-early-or-too-late/article_d914e694-d4bd-11e4-9095-271313a2e75c.html)

Leonard S (2015) "What makes anhydrous ammonia so dangerous?" Iowa Farmer Today, April 9, 2015, [http://www.iowafarmertoday.com/news/crop/what-makes-anhydrous-ammonia-so-dangerous/article\\_3fffca60-de1c-11e4-a0f1-e3647c7cf0ac.html](http://www.iowafarmertoday.com/news/crop/what-makes-anhydrous-ammonia-so-dangerous/article_3fffca60-de1c-11e4-a0f1-e3647c7cf0ac.html)

Leonard S (2015) "Anhydrous Injury: accident survivors share two stories." Iowa Farmer Today, April 9, 2015. [http://www.iowafarmertoday.com/news/crop/anhydrous-injury-survivors-share-stories/article\\_42711474-de0e-11e4-b5ff-bfc3d0920e11.html](http://www.iowafarmertoday.com/news/crop/anhydrous-injury-survivors-share-stories/article_42711474-de0e-11e4-b5ff-bfc3d0920e11.html)

Leonard S (2014) "Safety Watch: Knock-down effect of hydrogen sulfide." Iowa Farmer Today, July 31, 2015. [http://www.iowafarmertoday.com/news/safety-watch-knock-down-effect-of-hydrogen-sulfide/article\\_5ee9c556-37cd-11e5-bd54-df5b4864bca4.html](http://www.iowafarmertoday.com/news/safety-watch-knock-down-effect-of-hydrogen-sulfide/article_5ee9c556-37cd-11e5-bd54-df5b4864bca4.html)

Leonard S (2015) "Patience prevents accidents when baling, moving hay." Illinois Farmer Today, Iowa Farmer Today, August 17, 2015. [http://www.iowafarmertoday.com/news/safety-watch-patience-prevents-accidents-when-baling-moving-hay/article\\_411e3efc-4507-11e5-8e80-770aa4d80cec.html](http://www.iowafarmertoday.com/news/safety-watch-patience-prevents-accidents-when-baling-moving-hay/article_411e3efc-4507-11e5-8e80-770aa4d80cec.html)

Leonard S (2015) "Finding creative, safe solutions to keep farming." Iowa Farmer Today, September 11, 2015. [http://www.iowafarmertoday.com/news/regional/finding-creative-safe-solutions-to-keep-farming/article\\_fe8780d8-571e-11e5-a505-8f3f0e533a92.html](http://www.iowafarmertoday.com/news/regional/finding-creative-safe-solutions-to-keep-farming/article_fe8780d8-571e-11e5-a505-8f3f0e533a92.html)

Ramirez M, Ellis T (2015) "Safety Watch: Help farm kids play it safe." Missouri Farmer Today, Iowa Farmer Today, May 26, 2015. [http://www.iowafarmertoday.com/news/safety-watch-help-farm-kids-play-it-safe/article\\_0515386c-ff15-11e4-8e63-0b1fe13d1ba9.html](http://www.iowafarmertoday.com/news/safety-watch-help-farm-kids-play-it-safe/article_0515386c-ff15-11e4-8e63-0b1fe13d1ba9.html)

Rohlman D (2015). "ATV safety simulator renews push for increased safety." (June 8, 2015) KWWL, Channel 7. <http://www.kwwl.com/story/29270854/2015/06/08/atv-simulator-renews-push-for-increased-safety>

### **Grant Proposals Submitted and/or Funded**

Rohlman D. College of Public Health Global Health grant. (Funded 2015)

Rohlman D, Campo S. Developing online training for supervisors of young ag workers. (Funded 2015)

Rohlman D. Workplace stress in farmworkers and their families. (Funded 2014)

### **Co-authored Grant Proposals Submitted and/or Funded**

O'Brien K, Nonnenmann, M (2015). Characterization of Occupational Inhalation Exposure among Poultry Workers during the Highly Pathogenic Avian Influenza H5N2 Outbreak in the Midwest. (Funded 2015).

Ramaswamy M, Fethke N, Janssen B. Identifying job demands and health outcomes among Iowa beginning farmers. (Funded 2015).

Rudolphi J, Rohlman D. Identifying agricultural behaviors of Iowa's young farmers. (Funded 2014).

Rudolphi J, Rohlman D. Increasing the use of hearing protection among young adult swine confinement workers. (Funded 2015).