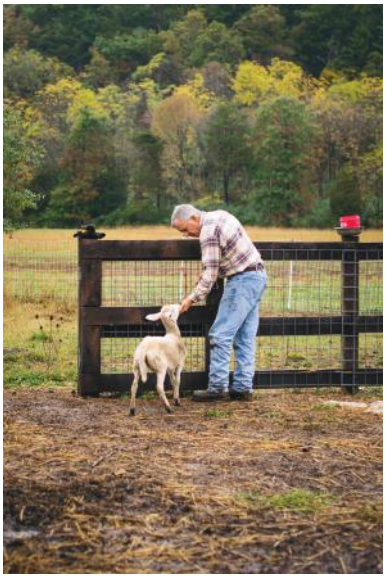
TURNING THE PAGE

UMASH Upper Midwest Agricultural Safety and Health Center

Upper Midwest Agricultural Safety and Health Center Research Briefs from 2011-2016



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Innovative research is one of the main pillars of the Upper Midwest Agricultural Safety and Health (UMASH) Center. Our occupational safety and health research projects aim to identify solutions to decrease illness and injury and, ultimately, improve the lives of agricultural workers in the Upper Midwest. UMASH has summarized the knowledge and solutions generated from our first years as a center (2011 - 2016) into "research briefs" for each project.

Featured Research Briefs

- Multidisciplinary Network to Address Agricultural Worker Health and Safety Issues
- Facilitating Return to Work for Injured and Ill Animal Agriculture Workers
- Surveillance for Zoonotic Disease in Agricultural Workers in Minnesota
- Surveillance of Disease and Injury in Wisconsin Dairy Farmers and Workers
- MRSA Colonization and Infection in Swine Veterinarians
- Occupational Hazards in Pork Production Associated with Production Practices
- Seguridad en Las Lecherias: Immigrant Dairy Worker Health and Safety

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UMASH is one of eleven Centers of Excellence in Agricultural Disease and Injury Research, Education, and Prevention funded by the National Institute for Occupational Safety and Health (NIOSH) throughout the United States. Funding is provided through a cooperative agreement from NIOSH, U54OH010170 (2009-2022).

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RESEARCH BRIEF

Project Dates: 2011 - 2016

Multidisciplinary Network to Address Agriculture Worker Health and Safety Issues

PROJECT PERSONNEL

- **Jeffrey B. Bender, DVM - Principal Investigator**
- **Bruce H. Alexander, PhD - Co-Investigator**
- **Carol Peterson, Coordinator**
- **Timothy J Goldsmith**
- **Matthew Keifer**
- **Michele Schermann**

SUMMARY OF FINDINGS:

- Successfully engaged varied stakeholders interested in agricultural safety and health.
- The project developed the following educational materials:
  - » Posters and fact sheet on dairy stockmanship or low stress animal handling techniques
  - » Several bi-lingual videos on a variety of topics, including agritourism (*youtube.com/umashcenter*)
  - » Posters and fact sheets on needlestick prevention and proper disposal of sharps
- Developed a user friendly tool for swine and dairy biological products database system for rural healthcare providers and poison control staff.
- Swine stockmanship educational materials needed for swine producers were evaluated.
- Vigorously worked on livestock worker health, immigrant worker health, agriculture safety and health education, and agricultural worker compensation data.
- To show the medical and economic impact of livestock associated injuries, the team worked with the regional insurance industry, the Minnesota Department of Labor and Statistics. The information gathered has been used to evaluate and prioritize emerging issues.
- In the endeavor to incorporate health and safety matters into the post secondary agricultural curriculum, a review of educational programs in the five-state region has been made in collaboration with AgriSafe Network, the University of Wisconsin-Eau Claire's College of Nursing and Health Sciences, and the Southern Minnesota Center of Agriculture.

PROJECT BACKGROUND

According to the 2017 CDC report, 416 farmers and farm workers died from a work-related injury, resulting in a fatality rate of 20.4 deaths per 100,000 workers and every day, about 100 agricultural workers suffer a lost-work-time injury. In Minnesota, there were about 2,518 agricultural injuries over the past decade costing some $31.3 million. Hence, having **a well-established network has become an important method for interchanging of ideas and sharing of expertise to solve the problems with greater creativity, resourcefulness and speed.**

The Network Project's goals included:

1. Develop a functional multidisciplinary network of diverse stakeholders that would address occupational health and safety issues among livestock workers.
2. Utilize the network as a surveillance mechanism for identifying emerging occupational health and safety issues.
3. Provide a platform to integrate knowledge gained from all UMASH projects to create potential solutions to identified health and safety hazards.

RESEARCH BRIEF:

Multidisciplinary Network to Address Agriculture Worker Health and Safety Issues

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WHAT DOES IT MEAN FOR AGRICULTURAL HEALTH AND SAFETY?

Farming operations are dangerous and rank among the most hazardous industries, according to the National Institute for Occupational Safety and Health. Contact with animals, machinery, noise and repetitive motion all contribute to injuries, disability and fatalities. Therefore, safety and health are important topic areas in current agricultural education programs.

Although the demand for graduates in the sector is strong, **very few programs have courses or materials that focus on maintaining the health and safety of the farm workers.** The team clearly underlined the need for incorporating safety and health as part of our educational curricula, targeting educational strategies for the next generation of farmers and workers, and strategizing on ways to improve health and safety in the changing agricultural sectors.

WHAT'S NEXT? WHAT ARE THE POSSIBLE SOLUTIONS OR RECOMMENDATIONS?

- The team indicated that farmworkers, veterinarians, and farm managers are exposed to multiple injury incidences on the farms. These injuries can be lethal or serious that may require medical attention. Accordingly, **continuous comprehensive worker safety and injury prevention trainings are indispensable.**
- When educational programs are designed, it would be worthwhile to **address language barriers, experience, ethnic cultural difference, and level of formal education of workers**.
- There is a vibrant **need for collaborative efforts** to promote agricultural health and safety education from farm owners, agribusiness, health care, agricultural banking, insurance companies, government, and academia.

IN CONCLUSION...

The Multidisciplinary Network Project sought to provide timely and relevant safety and health information, working with affiliated stakeholders in the agricultural sector. The cross connections and networking with individuals and groups identified a need for communication and collaboration. Agricultural safety and health is bigger than one person or one organization. The Multidisciplinary Network Project offered a template for successful engagement in the changing nature of agriculture operations.

Updated January 2022

LEARN MORE AT:

umash.umn.edu/network

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RESEARCH BRIEF

Project Dates: 2011 - 2016

Facilitating Return to Work for Injured and Ill Animal Agriculture Workers

PROJECT PERSONNEL

- Bryan Weichelt, PhD, MBA - Project Scientist
- Matthew C. Keifer, MD, MPH - Director
- Nancy Bellendorf, OTR - Consultant
- Shaun Halstead - Database Administrator
- Andrea Mahnke - Usability Analyst Senior
- Will Ray - Programmer/Analyst Senior
- Kate Thomas, MA - Usability Analyst
- Laurel Verhagen - Manager – Research Analytics

SUMMARY OF PROJECT OUTCOMES:

√ An interactive software application designed for clinicians to guide return to work planning for injured workers in animal agriculture. The application offers multiple tools, including:

- a database of dairy and swine job profiles
- an interface for clinicians to input a functional job analysis and receive an output of customized worksheets and relevant light-duty job activities (available in both English and Spanish) to support employee return-to-work
- a database of photos displaying over 1,000 farm tasks to aid physicians in understanding and communicating about agricultural tasks

PROJECT BACKGROUND

Agriculture is a dangerous industry. The Bureau of Labor Statistics indicates that the agriculture, forestry, fishing, hunting, and trapping industries account for nearly 30% of the economic cost of workplace injuries. While this number is high, it is likely an underreported figure. Within this group of agricultural industries, handling livestock is the most significant contributor to workplace injuries.

There is a clear need for practical workplace safety training to prevent injuries among livestock workers. Further, primary care physicians and insurers must be equipped with information and strategies to support workers recovering and returning to work.

The project's goals included:

1. Develop a compendium of dairy and pork tasks that encompass the various types of livestock production, size of the operation, and other variables that alter the ergonomics of each task.
2. Develop and conceptually test preliminary models for dairy and pork light-duty work options for five common injury/illness groups in each industry with key informants from healthcare and agricultural industries.
3. Conduct preliminary testing of the light-duty job activities (LDJA) for agricultural workers developed by physicians, Physical Therapists, and Occupational Therapists with 10-20 farmers and workers from dairy and pork operations and determine the feasibility of these modified activities for farmers/farm owners.
4. Develop a prototype return to work computer program with an interactive user interface to produce LDJA for injured workers and their employers.

IN CONCLUSION...

After the project team developed a comprehensive list of dairy and swine work activities, they developed models for light-duty work options for common injuries and illnesses. Then, they translated the models into an interactive, web-based software prototype, including a database of job profiles, a clinician interface, and an interactive input form. The software prototype translates clinician inputs into customized return-to-work sheets for farm owners and employees in English and Spanish.

Ultimately, the project characterized the duties and responsibilities of agricultural workers and created applicable return to work strategies, including LDJA, for farmers and farmworkers by physicians and other providers.

WHAT DOES IT MEAN FOR AGRICULTURAL HEALTH AND SAFETY?

New farmers or employees entering the agricultural workforce may have no prior experience working with livestock. Training may not thoroughly cover workplace safety, and needs to be linguistically and culturally appropriate for the workers. These barriers can increase the risk of occupational injuries while working with livestock.

If an employee is injured, primary care physicians play an essential role in treating and rehabilitating these workers. Unfortunately, many physicians don't have experience or a background in the livestock industry. **When insurance companies call on physicians to fill out workers' compensation paperwork and inform workers about work restrictions,** they have limited knowledge to base recommendations. In addition, they may be uncomfortable assigning light-duty job activities (LDJA).

Just like physicians, many insurers have a limited background in agriculture. This can lead to disagreements about recommendations from physicians and refusal to provide coverage or benefits as prescribed. Because of these factors, many employers decide it's just better for an employee to stay home until they are fully recovered - leading to additional lost wages for employees and increased workers' compensation expenses to employers.

WHAT'S NEXT? WHAT ARE THE POSSIBLE SOLUTIONS OR RECOMMENDATIONS?

The **interactive software can help physicians, farmers, and insurers understand and facilitate return-to-work** by accurately assessing worker injuries and work environments and providing tangible recommendations. The tool can also **decrease communication barriers and promote understanding between farmers, employees, and physicians** across English and Spanish languages.

LEARN MORE AT:
www.SafeReturnToWork.org

Updated March 2022

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RESEARCH BRIEF

Project Dates: 2011 - 2016

Surveillance for Zoonotic Diseases in Agricultural Workers in Minnesota

PROJECT PERSONNEL

- **Kirk Smith, DVM, PhD - Supervisor**
- **Richard N. Danila, PhD - Assistant State Epidemiologist**
- **Joni M. Scheftel, DVM, MPH - State Public Health Veterinarian**
- **Carrie Klumb, MPH - Senior Epidemiologist**

MAJOR FINDINGS AND OUTCOMES OF THE PROJECT:

√ **Enteric diseases represent a significant and previously underestimated source of zoonotic disease for agriculture workers** and those associated with agriculture.
√ Retrospective data housed in multiple independent databases was centralized through a new multi-pathogen surveillance system to track cases going forward.
√ The risk of acquiring a zoonotic enteric pathogen was **7.9 times greater** for people living on or working with food production animals compared to other Minnesotans.
√ **Campylobacter was the largest contributor** of enteric disease in people who lived or worked on a farm, comprising 62% of the cases in this group.
√ **Cryptosporidium parvum was the pathogen with the largest percentage of cases** indicating direct animal contact with 60% of cases having animal contact.
√ 17% of people with diagnosed zoonotic enteric disease were hospitalized, 43% had bloody stools and 17 people developed acute kidney failure known as Hemolytic Uremic Syndrome (HUS).

PROJECT OVERVIEW

Agriculture is an important part of Minnesota's economy, but its workers are at risk for injuries and illness. While the risk of fatal injuries is clear, the risk of zoonotic diseases (i.e., diseases passed between animals and humans) is less clear. This UMASH research project developed a system for identifying which enteric zoonoses show up in agricultural workers and how often. This team developed a population-based surveillance system to identify the most frequent and important zoonotic diseases among agriculture workers (including forestry), their families, and others exposed to agricultural work environments.

The project's goals included:

This study aimed to improve zoonotic disease surveillance, particularly concerning agricultural exposures. The project's long-term objective was to reduce exposure to, and illness from, zoonotic diseases. These objectives were addressed through the following specific aims:

1. Analyze historical data from MDH surveillance conducted since 1996 to identify zoonoses of importance to agricultural workers in Minnesota.
2. Prospectively determine the statewide incidence of laboratory-confirmed zoonotic infections in agricultural workers.
3. Detect and characterize emerging zoonotic diseases related to agricultural exposures.
4. Identify risk factors for the acquisition of zoonotic diseases by agricultural workers.
5. Develop, implement, and evaluate measures to prevent zoonotic disease in agricultural workers.
6. Survey all veterinary personnel in Minnesota regarding work-related illness and injury.

RESEARCH BRIEF:

Surveillance for Zoonotic Diseases in Agricultural Workers in Minnesota

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To accomplish these goals, study cases were categorized into three different tiers: Tier 1 – those living and/or working on a farm, Tier 2 – visiting a private farm and, Tier 3 – visiting a fair, petting zoo, agritourism farm or other public agriculture venue. Data from multiple sources were centralized into one database, allowing researchers to analyze a comprehensive collection of reported diseases.

Over five years, the project revealed some agents caused little disease, while others were a larger threat than previously estimated:

Larger threat
- Campylobacter
- Cryptosporidium parvum
- Salmonella
- Shiga toxin-producing E. coli

Minimal threat
- Community-associated Clostridium difficile
- Methicillin-resistant Staphylococcus aureus (MRSA)
- Blastomycosis
- Vectorborne diseases

The risk of acquiring a zoonotic enteric pathogen was 7.9 times greater for people living on or working with food production animals than other Minnesotans.

WHAT'S NEXT? WHAT ARE THE POSSIBLE SOLUTIONS OR RECOMMENDATIONS?

The multi-pathogen surveillance system is being used on an ongoing basis to monitor enteric disease. With continued surveillance, trends can be followed and educational materials and interventions created to prevent zoonotic enteric disease in agricultural populations.

WHAT DOES IT MEAN FOR AGRICULTURAL HEALTH AND SAFETY?

This study demonstrated that zoonotic enteric infections (that were not part of an outbreak) are more common in agricultural workers than in the general public**. Several basic prevention measures can reduce infection risk:**

1. Wear dedicated work clothing and remove your work boots when you come into your home.

2. Wash your hands with soap and water before you eat, drink, smoke, or use chewing tobacco, and before you go home at the end of the day.

3. Do not eat or drink around animals (i.e. keep the barn out of the employee breakroom).

Additionally, while there were more cases of zoonotic enteric disease than expected in this, only laboratory-confirmed cases were included. Therefore, **the findings likely underestimate the true burden of disease in this population.** The findings of this study inform prevention strategies for populations and farm environments with specific risk factors for zoonotic enteric disease. This project has already resulted in efforts to increase agricultural communities' awareness of these risks.

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RESEARCH BRIEF

Project Dates: 2011 - 2016

Surveillance of Disease and Injury in Wisconsin Dairy Farmers and Workers

PROJECT PERSONNEL

- **Jeff VanWormer, PhD - Associate Research Scientist**
- **Matthew C. Keifer, MD, MPH - Director**
- **Bruce H. Alexander, PhD - Professor, Department Head**
- **Stephen C. Waring, DVM, PhD - Senior Research Scientist**
- **Kathrine L. Barnes, MS, MPH - Research Specialist**
- **David McClure, PhD - Clinical Epidemiologist**

OUTCOMES OF THE PROJECT:

√ The study reinforced prior observations that injuries are common amongst dairy farmers and provided insight into possible risk factors, like having private health insurance, living off-farm, and not providing safety training to workers.

√ In addition, this study determined that **using medical codes for farm injuries can be correlated to certain high-risk activities and conditions.** Natural language processing to estimate the extent of work-related injuries did not improve this process.

√ Overall, the project team developed successful methods to conduct surveillance of agriculturally based injuries using electronic health records.

PROJECT BACKGROUND

Approximately 10% of farmworkers are injured each year, and dairy farmers have an exceptionally high risk of injury. How farmers get injured has been documented previously, but less is known about how distal and socio-environmental risk factors influence injury rates.

The project's goals included:

This exploratory study intended to inform future agricultural injury prevention research and safety initiatives with the following aims:

Aim 1: Establish a population-based estimate of the incidence of injury and illness

Aim 2: Develop a survey instrument to measure sociodemographic characteristics, farm environment features, and general safety practices

Aim 3: Identify high-risk activities and conditions associated with production processes and farm characteristics, and track any detectable influence on the frequency of injury or illness

Aim 4: Utilize natural language processing, a component of artificial intelligence that understands human language as it is spoken and written, to examine its utility in estimating the extent of work-related injuries

A cross-sectional survey was given to adult dairy producers in north-central Wisconsin within the Marshfield Clinic Health Systems electronic data repository. The survey covered licensed dairy producers within a 20-county target region within the Marshfield Clinics data system.

RESEARCH BRIEF:

Surveillance of Disease and Injury in Wisconsin Dairy Farmers and Workers

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Participants completed a 32 question survey seeking information on the following:

1) Personal sociodemographic characteristics – age, gender, race/ ethnicity, household income, health insurance, farm ownership, farm residence, off-farm employment.

2) Farm environment features and general safety practices – acres in agricultural production, number of cows, number of workers, feed storage facilities, number of tractors, use of other farm equipment, milking methods, manure handling methods, safety management role, safety training provided to workers, tractor rollover protection, and other available safety equipment.

MAJOR FINDINGS OF THE PROJECT:

The survey was distributed to 1293 farmers with a 72% response rate. Respondents who did not consent to have the survey linked to their electronic health records were excluded from the study, so 620 farmers were included in the final analysis. These farmers tended to be middle-aged (71% between 30 and 65 years old) and male dairy owners who lived and worked on their farms. There were 50 injuries observed from the cohort, leading to an estimated 5.7 injuries per 1,000 dairy farmers per year. Factors that were significantly associated with injuries included:

- **Having private individually purchased health insurance**
- **Living off farm**
- **Not providing safety training to farmworkers**

These results are correlational and more research is needed to confirm these findings using prospectively designed studies.

WHAT DOES IT MEAN FOR AGRICULTURAL HEALTH AND SAFETY?

Dairy farming in north-central Wisconsin is a risky occupation, with 8% of respondents having experienced an agricultural injury during the 14-year window of the study. Therefore, it is important to equip farmers with continual practices and measures that can help them to work safely and prevent injuries.

WHAT'S NEXT? WHAT ARE THE POSSIBLE SOLUTIONS OR RECOMMENDATIONS?

Future research should explore how factors such as insurance coverage, living environment, and safety training experience may impact injuries among Upper Midwest dairy farmers. Findings should help to identify strategies to address these factors and inform injury prevention initiatives for this population.

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RESEARCH BRIEF

Project Dates: 2011 - 2016

MRSA Colonization and Infection in Swine Veterinarians

PROJECT PERSONNEL

- **Peter Davies, BVSc, PhD**
- **Claudia Munoz-Zanzi, DVM, MPVM, PhD**
- **Srinand Sreevatsan, DVM, PhD**
- **Jisun Sun, DVM**
- **My Yang**
- **Montserrat Torremorell, DVM, PhD**

SUMMARY OF FINDINGS:

1. The initial studies revealed that swine veterinarians in the USA have prevalences of *S. aureus* (63%) and MRSA (9%) that exceed estimates for the general population in the USA (28%, 1.5%). For the most recent completed study (June 2019), prevalence of *S. aureus* (72%) and MRSA (12%) in swine veterinarians were again much higher than in the companion animal veterinarians and the general US population (37% and 2% respectively).
2. Of all the isolates, about 80% of the swine vet isolates were variants commonly found in pigs.
3. Both transient contamination and long term colonization can occur in veterinarians.
4. Despite high exposure, events of clinical *S. aureus* infection were not common.
5. Injuries *(mainly needle stick)* and non- infectious health problems predominate in swine veterinarians.
6. On farms, some PPE were regularly used but hearing protection and respiratory protection were employed sporadically.
7. The project also produced a library of *S. aureus* isolates from swine veterinarians.

PROJECT BACKGROUND

Methicillin-resistant *Staphylococcus aureus* (MRSA) is a critically important human pathogen that is an emerging concern in veterinary medicine and animal agriculture. It has become apparent that animals, particularly pigs, can constitute a separate MRSA reservoir and be a source of MRSA in humans. Some individuals who work closely with pigs, such as veterinarians, have high MRSA colonization rates. Considering this fact, intensive studies were carried out to provide new insight into the dynamics of interspecies transmission, and related health risks, of *Staphylococcus aureus* in the US swine industry.

The studies were designed to accomplish the following specific tasks:

1. Determine incidence and prevalence of nasal colonization of swine veterinarians with *S. aureus* (MRSA and MSSA) in the US.
2. Determine whether *S. aureus* strains shown to colonize pigs are causing clinical infections in swine veterinarians.
3. Describe use of personal protection practices of US swine veterinarians.
4. Quantify associations between risks of colonization/ infection of swine veterinarians with MRSA/MSSA and exposure to pigs and use of PPE.
5. Assess the trends in antibiotic resistance following regulatory changes in antibiotic use in the swine industry.

In the first phase of the study, 68 swine veterinarians across 15 states, predominantly in the major swine producing regions of the Midwest and Southeast, were recruited to participate in a longitudinal study. During the study period, the microbial genotypes detected in 38 veterinarians were compared with those found in pigs. Since 2016, sampling and survey data collection have been conducted from 117 participants. In the recent study, other zoonotic agents (influenza A virus and Hepatitis E virus) have also been included.

RESEARCH BRIEF:

Overview on MRSA Colonization and Infection in Swine Veterinarians

WHAT DOES IT MEAN FOR AGRICULTURAL HEALTH AND SAFETY?

In general, the studies evidently provided new perception into the dynamics of interspecies transmission, and related public health threats of Staphylococcus aureus in the US swine industry. The prevalence and isolates identified revealed in the study likely reflects the increased risk of exposure to S. aureus that occurs in pig farm environments and hence, veterinarians, farm owners, and farm workers can be permanently colonized by MRSA of swine origin and could eventually act as a means for the spread of superbugs to the general public.

IN CONCLUSION...

MRSA appears to be less common in US pig herds than anticipated and no serious infections have been seen in swine workers or veterinarians. The recent (2016-2019) report of the study team also showed that even though the prevalence is higher in swine veterinarians, there appears to be no indication of increasing MRSA prevalence. Nevertheless, as microorganisms are continuously changing, which is a natural phenomenon, similar studies or monitoring strategies are required to ensure the safety of veterinarians, farm owners, and farmworkers.

WHAT'S NEXT? WHAT ARE THE POSSIBLE SOLUTIONS OR RECOMMENDATIONS?

It is well recognized that people having regular animal contact are at the front line for exposure to known and emerging pathogens. **According to the findings, animal health workers, swine farm owners, farmworkers, visitors should ensure/aware of the following:**

- The period of follow up was limited and there were also areas of uncertainty regarding the duration of colonization of occupationally exposed people and its implications for disease risk of *S. aureus*. Therefore, more extensive observations (monitoring) of *S. aureus* infection risk in swine workers have paramount importance.
- Periodic educational programs are needed to promote better practices for veterinarians and other groups who are occupationally exposed to those animals.
- Ensuring good agricultural practice in the farms.
- Judicious use of antimicrobials should be practiced in farms to reduce the occurrence of drug resistance.
- Restricting visitors (avoid unnecessary visits) and direct contact with farm animals.
- Proper use respiratory protection, and other PPE usage need to be improved.
- Integrative work among pig farm owners, government, and concerned organizations is strongly recommended.

Updated November 2021

LEARN MORE AT:
umash.umn.edu/mrsa

UMASH is funded by the National Institute for Occupational Safety and Health cooperative agreement U54OH010170 (2011-2021)

Upper Midwest Agricultural Safety and Health Center

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RESEARCH BRIEF

Project Dates: 2011 - 2016

Occupational Hazards in Pork Production Associated with Production Practices

PROJECT PERSONNEL

- **Bruce H. Alexander, PhD - Professor, Department Head**
- **Jeff VanWormer, PhD - Associate Research Scientist**
- **Peter C. Raynor, PhD - Professor**

MAJOR FINDINGS AND OUTCOMES OF THE PROJECT:

√ Ammonia, respirable dust, and respirable endotoxin concentrations were **significantly higher on average** in the pen room, while Carbon dioxide was higher in the stall room.
√ All the biogases being studied, ammonia, hydrogen sulfide, and carbon dioxide, were **below recommended** levels. Respirable dust concentrations were also below the recommended limits.
√ Respirable endotoxin levels (a toxin released from bacterial cell walls which can cause disease) **exceeded** the Dutch Expert Committee on Occupational Standards proposed exposure limits from late autumn and to early spring.
√ Respirable endotoxin concentrations were **5 times greater** in the wet feed room vs. the dry feed room, resulting in the hazard index being 3 times as high in the wet feed room vs. the dry feed room.
√ Researchers estimated the risk posed by multiple exposures through a hazard index. The hazard index was **50% higher** in the pen room compared to the stall room.
√ Hydrogen sulfide concentration was **2.39 times higher** during power-washing (0.55 ppm compared to 0.23 ppm for control samples).
√ The **3,156 injuries** evaluated resulted in almost **32,000 total** days of lost work and cost over 12.7 million dollars
√ Animal interaction injuries, needlestick injuries, and knee injuries represented **37.5, 5.2, and 10.4 percent** of the total injuries.
√ These findings and resulting recommendations were shared with the National Pork Board to inform practices in swine production facilities that support the safety of workers and animals.

PROJECT BACKGROUND

Occupational hazards will always be a concern for those working in agriculture. As farms continue to change and evolve, it's important to understand the risks and costs to both employees and producers in these environments. This study was designed to look at air quality and injury risks across different types of swine production facilities. With the knowledge gained from identifying specific risks and the costs associated with them, changes can be made at the farm level to improve both the safety of workers and animals.

The study was designed to accomplish the following objectives:

- Evaluate how practices in pork production facilities with varying levels of animal confinement are related to worker health as indicated by concentration of airborne contaminants, including respirable dust, biogases, and endotoxins.
- Characterize the burden of injury and potential high risk types of injuries in pork production companies.

The project was divided into two main activities to measure how airborne contaminants are related to different production practices. Two sub-studies were conducted; one to compare contaminant levels in relation to sow housing and feeding methods, and another to evaluate potential risk associated with power washing done to decontaminate facilities as part of biosecurity protocols.

According to the findings, animal health workers, swine farm owners, farmworkers, visitors should be aware of the following:

- Airborne contaminant levels can vary by the activity being performed by farm workers, type of production facility, and feed type utilized within the facility
- While this study found airborne contaminant levels to be under regulatory thresholds, employees should be regularly trained on the proper use of respiratory protection and other personal protective equipment (PPE)

IN CONCLUSION

Injury poses a significant risk to those working in swine production facilities and can result in significant financial and labor costs. Companies and workers in these systems should be aware of these risks and follow animal handling and treatment protocols to reduce the risk of injury to both workers and animals. In addition, airborne contaminant levels can vary depending on a number of factors, and different facilities may be exposed to varying levels of exposure. **Facilities should ensure that employees use PPE correctly and facilities are maintained to reduce airborne contaminant exposure.** These results are correlational and more research is needed to confirm these findings using prospectively designed studies.

WHAT'S NEXT? WHAT ARE THE POSSIBLE SOLUTIONS OR RECOMMENDATIONS?

This project and its findings have served as a foundation for additional UMASH research projects that are working to understand and prevent occupational hazards in animal agriculture.

1. The **Assessing and Preventing Occupational Injuries in Animal Agriculture** project is collecting data to develop injury prevention and control protocols for producers, managers, and insurance loss control professionals.
2. The **Optimizing Assessment of Virus-Containing Particles in Animal Agriculture** project is developing a viral aerosol sampler to measure worker exposures to live airborne influenza viruses in animal agriculture facilities.
3. The **Longitudinal Study of Infectious Disease Risks at the Human-Swine Interface** is characterizing health risks attributable to pig exposure for zoonotic pathogens that are endemic in the US swine industry (i.e., livestock associated S. aureus, influenza A viruses, and hepatitis E virus). This project has also prompted an additional research proposal to define the job-associated risk factors that influence worker microbiomes within livestock production facilities.

WHAT DOES IT MEAN FOR AGRICULTURAL HEALTH AND SAFETY?

These studies demonstrate the potential for airborne contaminants to vary by swine production facility type and activities performed by workers. While the study facility was below safety thresholds, this may not be true for all facilities. **Precautions and modifications may be needed for safe work conditions in other barns.** Further work is needed to examine the impact of power washing on Hydrogen sulfide levels.

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RESEARCH BRIEF

Project Dates: 2011 - 2016

Seguridad en las Lecherías: Immigrant Dairy Worker Health and Safety Project

Photo Credit: EarlDotter.com

PROJECT PERSONNEL

- **Amy K. Liebman, MPA, MA - Director**
- **Matthew C. Keifer, MD, MPH - Director**
- **Yurany Sanchez - Community Outreach Trainer**
- **Iris Reyes- Research Specialist**

MAJOR OUTCOMES OF THE PROJECT:

√ Over **850 workers were trained on nearly 70 farms with almost 3,500 total training hours.**

√ The program **significantly improved worker safety knowledge** in the areas of animal handling, machinery, chemicals, confined spaces, and worker rights and responsibilities.

√ 88% of participating farms observed **reduced hazards** on their operation.

√ 100% of farms observed the same or improved communication between employers and employees.

√ 96% of farms believed the program's benefits outweighed the costs.

PROJECT BACKGROUND

Immigrant workers are increasingly crucial to dairy farms across the United States. As of 2015, immigrant workers were an estimated 51% of all labor in dairy operations, and on larger operations, they provided 79% of the labor (Adcock et al. 2015). Between 2008 and 2012, an average of 39 people died per year while working with dairy cattle and milk production (Slovak 2012). Interactions with cattle caused most non-fatal injuries and resulted in more time off work than other agricultural injuries. Many immigrant workers do not speak English and may have limited formal education and literacy, presenting challenges to effective safety education. The Seguridad en las Lecherias project implemented a community health worker (CHW) model to train selected workers on health and safety to enable training to other co-workers and put knowledge and training for workplace safety into the hands of the workers themselves.

The study accomplished the following objectives:

1. Translate and apply research to an occupational health and safety intervention for immigrant workers in dairy.
2. Engage dairy producers, farm managers, workers and clinicians, and health and safety professionals to raise awareness and increase understanding of strategies to improve the occupational health and safety of immigrant workers in the dairy industry.
3. Evaluate the intervention to determine the reduction in hazards, changes in knowledge, attitude, and practices among immigrant workers, and the acceptability of the culturally appropriate popular education (CAPE) model.

Culturally appropriate health and safety interventions were used to improve knowledge and reduce worksite hazards for immigrant workers in Wisconsin dairies. The foundation of this project involved conducting extensive literature reviews and focus groups with: **workers, extension agents, producers**, **clinicians, immigrant worker educators, insurers, and industry organizations.**

RESEARCH BRIEF:

Seguridad en las Lecherías: Immigrant Dairy Worker Health and Safety Project

MAJOR FINDINGS OF THE PROJECT:

Immigrant workers reported fear of sharing occupational hazards or injuries due to concerns about losing their job or being deported. Employers appreciated the CHW training, as it raised safety awareness and ensured safety was prioritized on the farm. 96% of farms believed the program positively impacted workplace safety, 73% felt it increased worker productivity, and 83% believed it improved worker satisfaction.

IN CONCLUSION...

Using a curriculum developed and tested for the project, bilingual researchers trained Spanish-speaking employees on participating farms with up to five hours of content. Workers selected as CHWs received additional training to conduct monthly safety walkthroughs, train new farm employees, and reinforce safety messages to coworkers. In addition, the CHWs were equipped with flip charts and checklists to aid in training and safety walkthroughs.

This UMASH project was a partnership between the Migrant Clinicians Network and the National Farm Medicine Center, bringing together expertise in immigrant worker health and safety with occupation health researchers. The Professional Dairy Producers of Wisconsin, an industry group with over 1,600 hundred producer members, was another key partner, fostering project implementation and adoption.

TO LEARN MORE ABOUT THIS PROJECT:

Producers interested in learning more about the project and how to implement safety training for Spanish-speaking workers can visit the Seguridad en las lecherias project page found on the UMASH website. Here, producers can find videos about the project, training curriculum resources, and an interactive map of other resources for Spanish-speaking residents in Wisconsin and Minnesota.

- Home page for Seguridad en las Lecherías
- The video about the training model
- Bilingual curriculum for dairy worker safety training

LEARN MORE AT:

umash.umn.edu

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