



**UMASH** Upper Midwest  
Agricultural Safety  
and Health Center

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Summary Annual Report  
2012

NIOSH Center of Excellence in Agricultural  
Disease and Injury Research, Education, and Prevention  
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## **SECTION I**

### **Center Summary:**

The Upper Midwest Agricultural Safety and Health Center (UMASH) is a Center of Excellence in Agricultural Disease and Injury Research, Education, and Prevention funded by the National Institute for Occupational Safety and Health (NIOSH). The center is a collaboration of the University of Minnesota School of Public Health and College of Veterinary Medicine, the National Farm Medicine Center of the Marshfield Clinic, and the Minnesota Department of Health. This collaboration brings together unique and complimentary expertise to address existing and emerging occupational health and safety issues in agriculture.

A central theme for UMASH is the interrelationship between the production practices and the farm workplace health and safety conditions. Production practices are primarily driven by social, economic and animal health considerations. In the agriculture, workplace health and safety conditions are strongly influenced by these production practices. The also UMASH emphasizes the concept of One Health which focuses on the interdependence between animal health, human health, and the health of the environment. The UMASH also emphasizes the importance of maintaining vigilance over how changes in agriculture production can influence the health and well being of agricultural populations.

The UMASH center has currently funded projects related to health and safety in the pork production industry, methicillin-resistant *Staphylococcus aureus* (MRSA) colonization and infection in swine veterinarians, surveillance of disease and injury in dairy farmers, surveillance of zoonotic diseases in agriculture workers, immigrant dairy worker health and safety, facilitating return to work of ill and injured workers, and establishing a multidisciplinary network to address agriculture worker health and safety issues. The center also has an outreach component to disseminate to and collect information from stakeholders. The UMASH has a pilot projects program to foster new partnerships, explore new opportunities and address emerging issues in the field of agricultural safety and health.

### **Relevance:**

The agriculture industry is challenged with responding to an increasing global demand for a safe and plentiful food supply, that is both affordable and produced in a sustainable manner. To meet this demand the industry will develop novel approaches to producing food. The changes accompanying food production will also impact the people who produce the food. Agriculture work can be hazardous. As agriculture evolves to meet increasing global food demand, the occupational health risks encountered by the agricultural work force will evolve with some hazards being eliminated and others emerging. The changing face of agriculture will also change who is producing food. Small family owned and operated farms may give way to larger enterprises that hire the majority of their labor force; including many who have no background in agriculture. Understanding and managing these changes is essential to protecting the health of agriculture workers and their families.

The Upper Midwest Agricultural Safety and Health Center (UMASH) conducts research, education and prevention activities aimed at improving the health and safety of workers and their families. The UMASH investigates how this evolving industry is changing the risks agricultural populations face. It develops improved methods to identify and reduce risks and it explores how best to interact with producers, agricultural workers and their families, and the broader agriculture community.

**Key Personnel:**

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**Ag Center web link:** [umash.umn.edu](http://umash.umn.edu)

## SECTION II

### Program highlights

#### Research Projects:

##### **Surveillance for Zoonotic Diseases in Agricultural Workers in Minnesota**

The Minnesota Department of Health has a sophisticated program to identify the causes of infectious diseases. The UMASH partnership with the MDH is leveraging this excellent disease surveillance system to better understand how to prevent disease related to exposure in agriculture. In 2012, the MDH conducted follow up interviews with 398 people who were exposed to an agricultural setting prior to becoming ill. These people had infections caused by germs often associated with livestock and poultry. They were offered MDH developed educational fact sheets describing how they could reduce their risk of being exposed to these germs while in an agricultural setting. Forty-six percent (46%) of people interviewed requested the fact sheet materials; additionally, the seven fact sheets were made available on the UMASH website. As part of the interview process MDH also offered free bacterial and parasitic testing of livestock and poultry. Five farms and one county fair elected to have testing done. MDH collected 75 fecal samples from livestock and poultry, and 38 of those samples tested positive for either a bacterial or parasitic germ. These results, as well as education were provided to the farm owners and the county fair director. Through this testing service a working relationship between the county fair director and MDH began. The fair director expressed interest in working with MDH to ensure the safety of fair visitors and even requested educational posters to be used next fair season. As an extension of this surveillance the MDH conducted a study of veterinary personnel in the state to ascertain occupational hazards in the clinical veterinary setting. Of particular interest to UMASH are veterinary personnel working with livestock. A total of 304 food, large, and/or mixed animal veterinary personnel completed the survey. The data will provide additional information for improving prevention of zoonoses in exposed populations. A summary of the study findings will be shared with veterinarians during the public health session at the Minnesota Veterinary Medical Association (MVMA) annual convention on February 9th, 2013 in Minneapolis, Minnesota. The engagement of the MVMA public health committee will help UMASH connect with stakeholders in the veterinary community.

The MDH initiated the 'Ag Safety and Health Spotlight: Stories from the Field'; an online story/interview forum for the UMASH website featuring real life experience relating to the UMASH mission. The idea for the forum came directly from interviewing people who had diseases potentially related to agriculture. The first story was recently published; it features a family who lives on a dairy farm whose youngest child developed a severe *E. coli* O157:H7 infection that required hospitalization. This project will providing a platform for agricultural workers and their families to share stories and educate each other about the issues they face.

##### **MRSA Colonization and Infection in Swine Veterinarians**

Public health concern about the emergence of methicillin resistant *Staphylococcal aureus* (MRSA) in livestock, particularly pigs, has been aired in recent years. While there is a lot of debate, there is limited scientific information on the importance of livestock associated MRSA in human populations. The overall objective of this study is to analyze long-term patterns of *S. aureus* colonization (both methicillin resistant (MRSA) and methicillin susceptible (MSSA) strains) and infection of swine veterinarians. Concurrently, a survey of occupational hazards for US swine veterinarians and current practices for risk reduction is being conducted to assess current practices in relation to existing

recommendations and guide educational efforts to promote better practices for veterinarians and other groups who are occupationally exposed to animals.

A study cohort of 68 swine veterinarians across multiple states was recruited to participate in a longitudinal study to determine the incidence and prevalence of nasal colonization of MRSA and MSSA. Swine veterinarians provide an excellent sentinel population for human contact with pigs with MRSA. The study participants are submitting monthly nasal swabs and compliance has been excellent, with only 4 missing samples in the first 6 months of sampling. Bacteriological evaluation has been completed on the first 4 months of sampling and the MRSA and MSSA strains are being evaluated by bacteria subtype. This study will provide unique information on livestock associated MRSA in people working with animals. Additionally an online survey is being administered to approximately 400 US swine veterinarians to determine the occurrence of occupationally related health events in US swine veterinarians, focusing on skin and soft tissue infections. To date, 165 responses have been received and data collection is being continued. Survey data will be used to determine the personal protection practices of US swine veterinarians and will permit analysis of associations between risks of colonization/infection of swine veterinarians with MRSA/MSSA, exposure to pigs and the use of personal protective equipment.

### **Occupational Hazards in Pork Production Associated with Production Practices**

Working with pigs can be risky and even the most experienced pig handlers can be injured by being knocked down or into a stationary object, and some of the job tasks can lead to injuries from repetitive motion and over use. Breathing the air inside a pig barn can also affect the respiratory system if levels of toxic gases, dusts or endotoxins build up. The design of facilities in which pigs are raised has a direct impact on the work environment of the agricultural worker. Pig raising facilities have changed over the years and will continue to change in response to animal health, economic, and societal concerns. This project is evaluating the potential impact of facility design on the potential for exposure to respiratory toxicants and injury risks. Over the course of the study several design factors will be evaluated. One of the questions the study is currently focusing on is how the work environment may differ when sows are raised in gestation crates compared to gestation pens. There is substantial pressure on the industry to move away from gestation crates. This may impact on workers and understanding these factors will help prepare for potential changes. There are also work environment differences in facilities that finish pigs for market. These factors are also being explored as another in the context of providing an environment that keeps both the pigs and the workers healthy and safe.

### **Surveillance of Disease and Injury in Wisconsin Dairy Farmers and Workers**

A persistent challenge in identifying factors that impact the health and well being of agricultural workers is the lack of high quality population based data. The main objective of this project is to establish and maintain a working surveillance system for dairy farms in Wisconsin in order to identify disease and injuries among farmers and farmworkers in Wisconsin particularly as it modernizes technology, changes workforce make up and adjusts to market demands. The high rates of injuries and illness among this population are well documented, and changes to industry processes and populations will likely impact the risk factors for injury and illness in the farm worker population. Because dairy is the most important agricultural resource in Wisconsin, results from this project will impact many factors ranging from medical expenditures and/or hospitalization rates to agricultural safety policies and procedures. The National Farm Medicine Center (NFMC) study uses information available through the revitalization of the Marshfield Farm Cohort. The Farm Cohort is a special registry of farm residents within the Marshfield Epidemiologic Study Area (MESA). This cohort will allow researchers to perform

surveillance and population based research among the local farming community. This resource provides reliable and current information to the NFMCC, and exhibits the strength of the program through collaboration. This information is paired with a recurrent survey of dairy farms exploring injuries, illnesses and changes in dairy practices.

In addition to the original objectives of this project several spin off activities have developed as a result of the NIOSH resources.

- An active sub-study of Lyme disease incidence/prevalence rates in the Marshfield Farm Cohort vs. the general MESA population.
- An active sub-study comparing the natural language processing vocabulary derived through clinical text analysis and knowledge extraction systems (CTAKES) vs. computer based sentiment analysis.
- The research team at MERC and the Biomedical Informatics Research Center (BIRC) are utilizing Natural Language Processing (NLP) to more efficiently define farmers and developing a parallel cohort of farm working, non owners through text searches within medical records.
- Inclusion of the Marshfield Farm Cohort in AGRICOH, world-wide consortium of agricultural cohort studies.

## **Education and Translation Projects:**

### **Facilitating Return to Work for Injured and Ill Animal Agriculture Workers**

When a worker is injured on the job the recovery period can be long. During this recovery period it is in the best interest of the worker and the employer for the worker to get back to work as soon as physically possible. Unfortunately, this route of return can be delayed if health care providers are unfamiliar with the types of light duty tasks an injured agricultural worker can do as they progress to full recovery. The National Farm Medicine Center is developing a computer application that allows clinicians to facilitate an injured worker's return to work through light duty work options. Conducting job and task profiling which will include stresses, forces and conditions inherent in dairy and pork related jobs will provide information to clinicians which will help address the communication gaps that exist between physicians and therapists involved in worker care. To date, work measurements have been done on 10 dairy farms and two farm implement dealers in Wisconsin, as well as three pork farms and a pork research facility in Minnesota. An added benefit of this project is the opportunity to develop recommendations for ergonomic modifications to decrease the worker's risk for injury. During the needs assessment process, and at a poster presentation at the Midwest Rural Agricultural Safety and Health (MRASH) conference, the potential end users of this application exhibited great interest in this initiative; these potential users included dairy farmers, clinicians, and insurers.

### **Seguridad en las Lecherías: Immigrant Dairy Worker Health and Safety**

Seguridad en las Lecherías is bridging the gap in worker health and safety training in dairy production, by testing a culturally appropriate, occupational safety and health intervention to reduce worksite hazards and to improve knowledge and practices among immigrant dairy workers in Wisconsin. To date, the project team has developed and tested a health and safety training curriculum to educate immigrant dairy workers, many of which have received limited or no training on health and safety issues. The curriculum incorporates the findings from the needs assessment, evidenced based health and safety practices and current research. The curriculum includes five modules on the following topics: Hazard Identification and Control, Animal Safety, Machinery Safety, Worker Rights and

Responsibilities, and Chemical Safety. The modules are designed to engage participants using culturally appropriate education techniques, ensuring effective content delivery for Spanish speakers with low levels of literacy and limited formal education. Over 200 images from Earl Dotter, a world-renowned occupational photojournalist, are used throughout the training, ensuring the materials use images which consistently represent a modern working farm. Each module, which was successfully piloted and evaluated by project staff, includes culturally appropriate evaluation tools to ascertain changes in knowledge. A ‘train the trainer’ approach and *promoters de salud* (lay health workers) will be employed as part of this project, working with UMASH partners to train hundreds of agriculture based workers. The curriculum will be reviewed and approved by OSHA, and we are in the process of facilitating a proposed health and safety certification program with the Mexican government for workers completing the entire course.

The Seguridad project partners with the NFMC’s Agricultural Safety Consulting (ASC) program. The project’s curriculum and training methodology will be integrated into ASC services. The Seguridad team has helped to strengthen ASC’s capacity to address the health and safety needs of immigrant workers in a culturally and linguistically appropriate format.

### **Multidisciplinary Network to Address Agriculture Worker Health and Safety Issues**

UMASH has continued to meet with stakeholders regarding health and safety issues. This includes the following networking related projects: 1) Animal handling techniques to protect livestock workers, 2) needlestick prevention, 3) Responding to H3N2v Influenza Linked to Swine Exhibitions in Fairs.

#### Animal Handling Techniques to Protect Livestock Workers

Initially the UMASH center began working with dairies in Minnesota to explore the impact of “low-stress livestock handling techniques” as an avenue for protecting livestock workers and promoting humane livestock handling. Currently, little work has been done to evaluate the impact of worker training in this area in relation to worker injury rates. We have actively engaged two large dairies in Minnesota to better understand the training and injury concerns that they face. Both of these large dairies have implemented livestock training programs. We plan to monitor injury rates in relation to these newly instituted programs. Similarly, we have piloted a survey of traditional dairies in Minnesota to document injury rates. These dairies are small with few employees but we plan to assess the impact of pre-designed livestock handling programs on injury rates in these operations as well. One of our future goals is to assess livestock handling training programs on swine operations. The UMASH center is working closely with the National Pork Board on how to implement this initiative.

#### Needle-stick Injuries in Livestock Workers

Needlestick injuries are common in agricultural workers and veterinarians. The UMASH Center has undertaken an extensive literature review of needlestick injuries in agricultural workers. Beyond identifying injury types, injury rates and outcomes, this review identified high-risk behaviors, as well as on-the-farm sharps accident prevention methods and programs. An academic review article is in preparation for publication. The Center is also developing user-friendly information on prevention techniques and drugs of particular concern. This endeavor initially focused on human exposures to swine biologics. We have created a database built on Material Safety Data sheets (MSDS) and product inserts. The goal is to provide a useful dataset for government officials (i.e. USDA), poison control centers, and occupational medicine practitioners.

### Responding to H3N2v Influenza Linked to Swine Exhibitions in Fairs

Agricultural fairs are popular venues in the United States. These venues provide important learning opportunities for young people, especially children in agriculture such as those that participate in 4-H and FFA programs. In 2011 and 2012, a number of influenza illnesses were linked to swine exhibition at County and State Fairs. In 2012, a total of 309 cases of H3N2v were identified in 12 states; 16 individuals were hospitalized and one death was reported. These events led to the formation of a working group to provide measures to minimize influenza transmission between swine and people and people and swine. The UMASH Center personnel worked to develop educational materials here for Minnesota fairs and made them widely available. The center is continuing to provide input in the development of materials for the upcoming 2013 session agricultural fair season. This effort involves several state and national partners, including the USDA, CDC, International Association of Fairs and Exhibitions, State Departments of Health, State Departments of Agriculture, academic institutions and Centers for Excellence in Influenza Research and Surveillance.

### **Outreach**

A key mission of UMASH is connecting with our stakeholders. Together with our partner organizations and evaluation team, we have developed a systematic and multi-disciplinary approach to identifying stakeholders and effective communication linkages with them. Our contact and stakeholder base includes agribusinesses, cooperative extension of regional states, health care provider organizations, producer groups, university (academic) departments; target groups include academic faculty, health professionals, farm families, farmworkers, ethnic/minority workers, general public, insurance and discipline specific professionals in agricultural engineering, agricultural science, animal science, education, medicine, environmental health, epidemiology, industrial hygiene, nursing, public health, toxicology, and veterinary medicine.

UMASH outreach team members have established a presence on Facebook, through a targeted blog which links from the UMASH website, and then through active Twitter dialogue. We have worked to link our friends to stories that focus on agricultural and environmental safety, One Health Issues and industry specific topics. Our quarterly newsletter "The UMASH Connection: Farms and People" was published Fall 2012 and Winter 2013 and is archived on the website. Also hosted on the UMASH website are project updates and faculty presentations. UMASH personnel have presented Center and project information at more than seven conferences and symposiums in the past year. Print materials for Center promotion and Outreach include the newsletter, a poster, flier, postcards, and business cards for all staff. Successful leveraging of resources with Center partners has resulted in the development of the Migrant Clinicians Network "Bilingual Health and Safety Pictionary"; the Agriculture Safety Consulting program developed by the National Farm Medicine Center is developing systematic tools that producers can use to improve safety and comply with regulatory requirements, and the Minnesota Department of Health has developed timely and relevant fact sheets on zoonotic disease prevention and control and a first person farm family story of health and safety interest available in our new 'Ag Spotlight' feature which are all posted for consumer use on our website at [umash.umn.edu](http://umash.umn.edu).

### **Evaluation:**

Understanding the impact of the UMASH center requires systematic evaluation. The UMASH is collaborating with the Minnesota Evaluation Studies Institute at the University of Minnesota to develop evaluation tools for the UMASH center. In 2012 two projects were developed and piloted to evaluate center activities around collaboration and stakeholder analysis:

- Stages of Collaboration which is evaluating current and desired levels of collaboration across and beyond the UMASH Center through interviews and creation of collaboration maps with project PIs and team members.
- Stakeholder Gap Analysis Project which is evaluating power and interest levels of UMASH stakeholders through interviews and mapping activity with UMASH Advisory Board Members.

The evaluation is also developing an evaluation plan and metrics to evaluate UMASH communications. One such metric showed a significant increase in the open rate of the Winter 2013 UMASH Connection newsletter (25.3%) as compared to the Fall 2012 e-newsletter (1.8%) and similar to rates for the Pilot Project announcements (Feb 2012 30.4%; Jan 2013 26%) and the Nov 2012 announcement about the Finding Common Ground Forum (25%). It's likely the increase is due to a major redesign of the newsletter increasing the visual impact and relevance to our current audience.

UMASH hosted a meeting (October 2012) bringing together evaluators and staff from nine of the NIOSH-funded Ag Centers & Children's Ag Center to network with the goals of building evaluation capacity and identifying opportunities for cross-center collaborations utilizing a workshop format to share ideas, expertise, and tools for evaluation.

## **Other Center Activities Facilitated by NIOSH Funding of UMASH**

### **Dairy Health and Safety Needs Assessment**

Three UMASH projects focus on dairy health and safety: Seguridad en las Lecherías, Return to Work, and Surveillance of Disease and Injury. The NFMC and Migrant Clinician Network conducted a needs assessment to gather relevant data to focus these activities. The needs assessment held interviews with farmers, clinicians, researchers, trainers, dairy industry representatives and farm insurers. A focus group was held with 17 agriculture extension agents and five focus groups were held with a total of 37 Hispanic dairy workers. The needs assessment is providing guidance for current activities and will aid future activities.

### **Agricultural Safety Consulting Program.**

The Occupational Safety and Health Administration (OSHA) in Wisconsin implemented a Local Emphasis Program (LEP) for the dairy industry in Wisconsin. With the dairy industry evolving to rely more on a hired workforce it will receive more attention from OSHA. Dairy producers recognized they needed more information on dairy safety and the regulatory process and were requesting assistance. In response, NFMC established the Agricultural Safety Consulting (ASC) program to assist the dairy industry in improving safety and preparing for OSHA inspections, as well as to strengthen UMASH efforts. To date nine farms were inspected and an average of 19 hazards was identified per farm. Trainings were conducted on two farms for a total of 47 workers.

### **Understanding the Role of Animal Welfare in Worker Safety: An Emerging Issue**

Changing economic conditions and societal drivers have an impact on how food animals are raised. The growing world population and growing global middle class is driving increased demand for food and, specifically, for animal protein. Meeting this rising demand for a safe and affordable food supply includes consideration of production practices for efficiently rearing food animals. Societal concern about the welfare of livestock recently has driven some government and private sector policy regarding animal agriculture practices, with the focus being on changes in systems of production, particularly housing methods. Largely absent from this discussion is consideration of the role of, and the impact on,

the people who have primary responsibility for the care of these animals -the agriculture worker. Whether they are the owner operator, a family member, or hired employees, the people who work in animal agriculture are exposed to known, but preventable, risks for injury and illness. While managing these risks can conflict with animal welfare standards, changes could benefit both the animals and the workers. The UMASH in conjunction with the University of Minnesota's Center for Integrative Leadership and Global Initiative for Food Systems Leadership sponsored a forum called "Finding Common Ground," which was designed to foster conversation among participants with diverse perspectives to discover and advance a common good. Participants from academia, industry, intergovernmental, nongovernmental and governmental organizations examined the issue of animal welfare and worker safety in a neutral forum to consider multiple perspectives. As part of the second year of the pilot projects program, UMASH is specifically requesting proposals to further develop these ideas.

### **Other Collaborations and Partnerships:**

NFMC contracted Earl Dotter to take over 1,000 photos depicting the hazardous working conditions of dairy farmers and workers. The photos have been and will be utilized for various programs including all UMASH projects.

The National Children's Center for Rural and Agricultural Health and Safety (NCCRAHS) used NFMC's Earl Dotter photos for their Cultivate Safety program including the "Parent First; Farmer Second" national media campaign. They also used these photos for their Childhood Agricultural Safety Network annual calendar, which saw a distribution of 5,000 copies worldwide.

NFMC has launched a statewide roll-over protection system (ROPS) program in collaboration with the New York Center for Agricultural Medicine and Health (NYCAMH), part of The Northeast Center (NEC) of Agricultural Safety and Health. Using NFMC donated funds, the program aims to keep farmers and workers safe by significantly subsidizing ROPS installation on tractors in Wisconsin.

NFMC, MCN and the University of Wisconsin at River Falls' (UWRF) Center for Dairy Farm Safety have forged a partnership to strengthen the NFMC's work with farmers and workers. This will include leveraging UWRF's collaboration with OSHA to obtain OSHA validation for the Seguridad en las Lecharias curriculum.

### **Pilot Projects Program**

The UMASH pilot project program is intended to explore new areas and build new partnerships in agricultural safety and health. The pilot project program emphasizes projects that address National Occupational Research Agenda (NORA) objectives for agriculture and approach One Health problems in agriculture. It is anticipated that the pilot projects will foster additional work in these areas. The first year of the UMASH pilot project program engaged four new programs that show promise for building capacity to improve the health and well being of agricultural workers and their families.

- **Pilot Project Exploratory Immunologic Differences in Cord Blood from Infants Born into Farming Environments Compared to Non farming Environments in MESA**

University of Wisconsin Madison.

The aim of this project is to provide preliminary data for a larger study addressing the hypothesis that in utero exposure to farming environment results in innate immune responses at birth that are more robust than exposure to non-farming environments. This partnership allowed

the UWM to successfully leverage its work with NFMC and obtain a 5-year grant from the National Institute of Health totaling almost \$4 million to conduct a more comprehensive version of the study.

- **Design Guidelines for Healthy and Safe Animal Production Building Systems**  
Center for Rural Design, University of Minnesota  
This project will draft design guidelines for animal housing buildings in commercial animal production systems. The utilization of these guidelines in the design, construction, and management of these buildings will lead to a safer and healthier operation for workers.
- **Characterization of shiga-toxin producing E. coli infections and cryptosporidia in South Dakota with respect to agricultural exposures and other risk factors.**  
South Dakota State University  
Shiga-toxin producing E. coli (STEC) infections and cryptosporidiosis are significant causes of illness and South Dakota residents consistently are afflicted with these illnesses at higher rates than the general US population. This pilot project will develop capacity in South Dakota to improve surveillance of agricultural exposures related to these diseases.
- **Developing Culturally and Linguistically-Appropriate Pesticide/Chemical Education Materials for Hmong Produce Growers**  
Bioproducts and Biosystems Engineering Department and University of Minnesota Extension  
Hmong farmers in Minnesota have little access to culturally-relevant, easy-to-understand pesticide education materials. To meet this need, this project is working with Hmong farm families to develop educational materials, compare the effectiveness of various education methodologies, and expand the current Agricultural Health and Safety Program at the University of Minnesota to include pesticide and chemical safety education for Hmong and other limited-English proficiency (LEP) farmers.