



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 with the Migrant Clinicians Network, and the Minnesota Department of Health.

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Summary Annual Report

2018-2019

NIOSH Center of Excellence in Agricultural
Disease and Injury Research, Education, and Prevention
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SECTION I: CENTER OVERVIEW

Background: A Focus on Agricultural Health & Safety

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 is developing novel approaches to producing food. The changes accompanying food production will also impact the people who produce the food. The complex and varied nature of the agricultural workplace contributes to agriculture being one of the most hazardous occupations. 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 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.

To address the complex and evolving health and safety challenges within the agricultural production sector, 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. 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 agricultural community.

About the UMASH 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** with the **Migrant Clinicians Network**, 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.

UMASH focuses on the interrelationship between agricultural production practices, farm workplace health and safety conditions, and the interdisciplinary connections needed to address agricultural worker health and safety. Agricultural production practices are primarily driven by social, economic, and animal health as well as productivity considerations. These agricultural production practices, in turn, strongly influence workplace health and safety conditions.

UMASH emphasizes the concept of **One Health** which engages multiple disciplines and sectors to understand the interdependence between animal health, human health, and the health of the environment. UMASH also emphasizes how the ever-changing nature of agriculture can influence the health and well-being of agricultural workers.



The current five-year grant cycle (2016-2021) includes six funded projects in support of agricultural worker health and safety:

1. Optimizing Assessment and Control of Virus-Containing Particles in Animal Agriculture Operations
2. Rural Firefighters Delivering Agricultural Safety and Health (RF-DASH)
3. Promoting Safety and Worker Health for Immigrant Dairy Workers
4. Longitudinal Study of Infectious Disease Risks at the Human/Swine Interface
5. Surveillance and Control of Zoonotic Diseases in Agricultural Workers in the Upper Midwest
6. Assessing and Preventing Work Related Injuries in Animal Agriculture

The center also has an **outreach** component to disseminate and collect information from stakeholders; an **emerging issues program** to explore new opportunities and address emerging issues in the field of agricultural safety and health; and an **evaluation** program to monitor and assess the performance and outcomes of the center.



UMASH Key Personnel	Role
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SECTION II: UMASH RESEARCH PROJECT UPDATES

Monitoring Zoonotic Diseases in Minnesota Agricultural Workers, Their Families and Those Who Engage in Agritourism



Agriculture is the foundation of Minnesota's economy. Minnesota ranks 5th in the United States in overall agriculture production and generates over \$112 billion annually in total economic impact while supporting more than 430,000 jobs. Minnesota is the largest producer of turkeys in the U.S. and the 3rd largest producer of hogs. Agriculture is not only integral to Minnesota's economy; it is also a big part of Minnesota culture. More than 90 county fairs and the Minnesota State Fair attract more than 2.1 million visitors each year. Food production animals naturally carry several zoonotic pathogens (germs that can be passed between animals and people) that can cause illness in agricultural workers, their families, and visitors to fairs and farms. However, little information is available on how commonly these populations acquire zoonotic

diseases from food production animals, as well as specific on-farm risk factors for acquiring these diseases from food animals.

Since 2012, this UMASH project at the Minnesota Department of Health (MDH) has focused on documenting the scope of this problem in agricultural populations and visitors to agricultural venues. This information will inform prevention measures and guide our educational efforts around zoonotic enteric diseases.

Illnesses caused by *Cryptosporidium*, *E. coli* O157:H7 and other Shiga toxin-producing *E. coli* (STEC), *Campylobacter*, and *Salmonella* infections are reportable to MDH, and all ill people are interviewed with a routine questionnaire that includes questions about agricultural exposures (living on, working on, or visiting a farm, petting zoo, fair, or other venue with animals). Since 2012, patients who report a food animal agriculture exposure have been re-interviewed with a more detailed questionnaire about their interactions with the animals.

From 2012-2018, there were 11,399 laboratory-confirmed illnesses among Minnesotans that were eligible for our study. Of these, 2,590 (23%) reported an animal agriculture exposure in Minnesota right before they got sick. Sixty-two percent of ill people with an animal agriculture exposure reported living and/or working on a farm, 28% reported visiting a private farm, and 10% reported visiting a public animal agriculture venue.

Fifty-nine percent of all Minnesota residents with a *Cryptosporidium parvum* infection, 27% with a *Campylobacter* infection, 23% with an *E. coli* O157:H7 infection, 16% with a non-O157 STEC, and 10% with a *Salmonella* infection reported a food animal exposure prior to their illness. These percentages are much higher than previously estimated for most of these pathogens. Additionally, Minnesotans who live or work on a farm are 8 times more likely to be diagnosed with one of these infections than Minnesotans who do not live or work on a farm.

In the coming year, we will be making some changes to the questionnaire to better describe backyard chicken and hobby farm exposures. We will continue to collect data in 2020. We will also be focusing on publishing pathogen specific papers using the data collected from 2012-2018 and we will work on assimilating similar data from neighboring states.

MDH also investigates animal-contact related outbreaks. For the fourth year in a row, Minnesota was part of a large, nationwide outbreak of *Salmonella* infections associated with live baby poultry contact. Thus far in 2019, over 1,100 people from 49 states (including 33 from Minnesota) have become ill with salmonellosis, resulting in 219 hospitalizations and 2 deaths. MDH is partnering with the Minnesota Board of Animal Health to educate both the stores that sell live poultry and the people who purchase poultry. MDH also investigated an outbreak of *Cryptosporidium* infections associated with a school field trip to a private farm. We conducted a site visit at the farm and worked with the operator to come up with tailored recommendations that would limit the risks of another outbreak occurring on the farm. Providing these tailored, one-on-one consultations has become a larger part of the work we do to help prevent these outbreaks from occurring. Additional outreach activities are described in the Outreach section of this report.

[Longitudinal study of infectious disease risks at the human-swine interface](#)

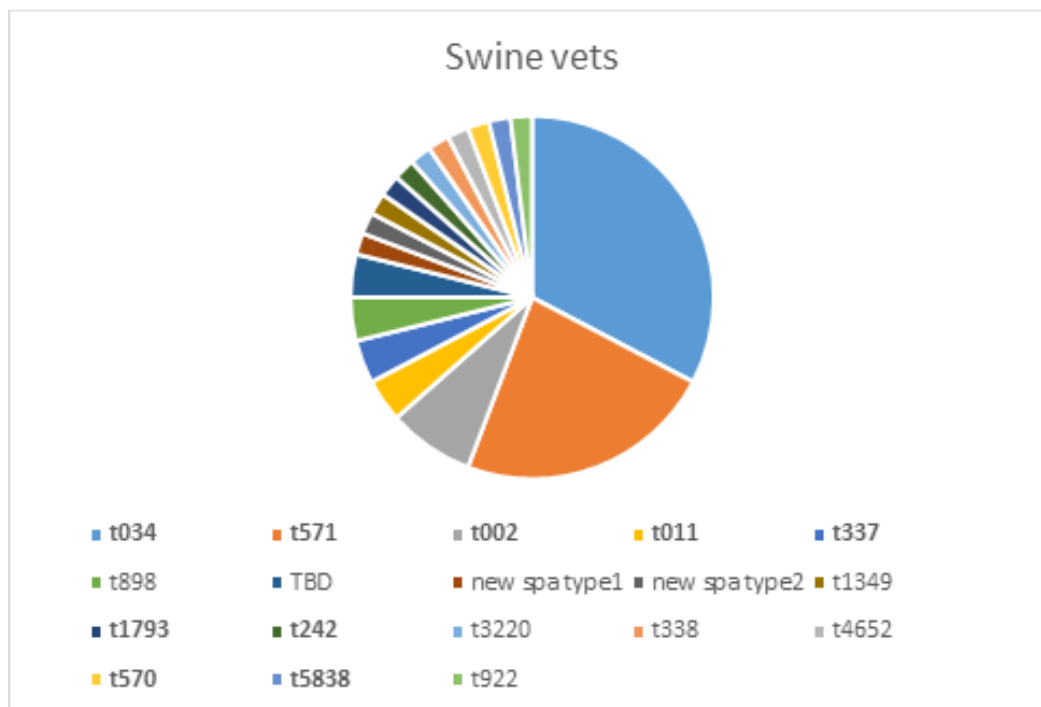
In this 5-year project, we will compare the rates of self-reported clinical illnesses likely to be related to three zoonotic agents (*S. aureus*/MRSA; influenza A virus, Hepatitis E virus) in cohorts of swine veterinarians and companion animal veterinarians. Rates of exposure will be compared based on quarterly submission of nasal swabs (*S. aureus* and influenza), or by collecting three blood samples from the swine vets over the course of the study (Hepatitis E virus). Sampling and survey data collection are conducted quarterly in March, June, September and December each year. None of the 117 participants has withdrawn from the study, and the group has maintained high compliance in sample collection (~ 98%) and survey completion (~95%). Data obtained over the last year are consistent with the earlier years and confirm that the swine veterinarians test positive for *S. aureus* much more often than the companion animal veterinarians do, and that they are predominantly carrying *S. aureus* variants of swine origin. For the most recent completed sampling in June 2019, prevalence of *S. aureus* (72%) and MRSA (12%) in swine veterinarians were again much higher than in the companion animal control group (37% and 2% respectively). The prevalences of *S. aureus* and MRSA in the companion animal are similar to historic data for the general US population. Although prevalence is higher in the swine veterinarians than the control group, there appears to be no indication of increasing MRSA prevalence in swine veterinarians to date in the course of this study, or compared to our earlier study in 2013/2014.

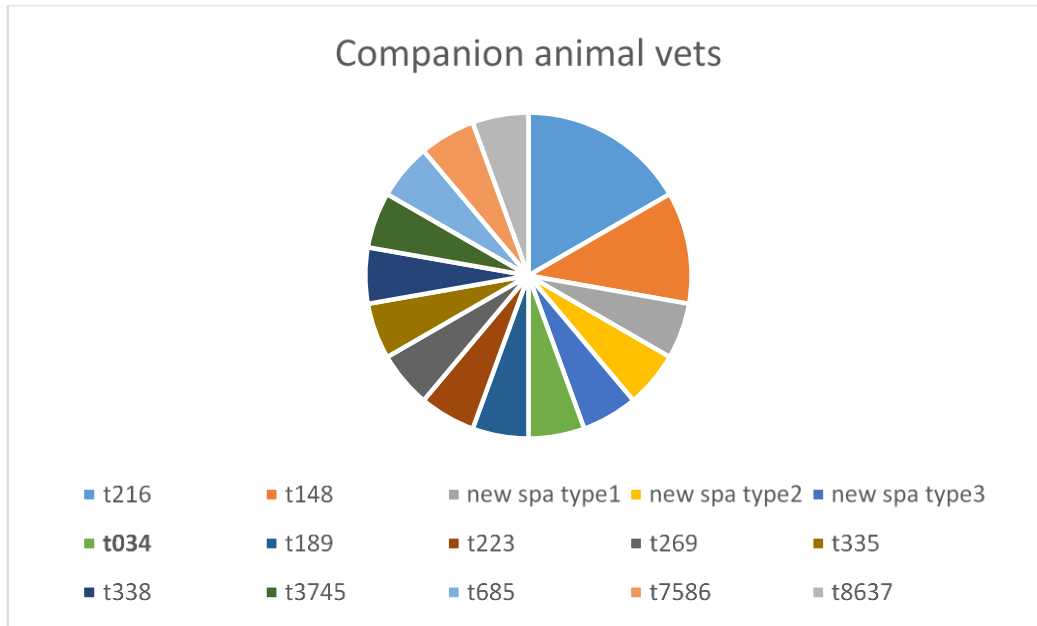
Based on spa typing of all isolates, about 80% of the swine vet isolates are 'livestock associated' variants commonly found in pigs (Figure 1). With one exception, putative livestock variants have not been detected in companion animal vets. One companion animal veterinarian continues to be consistently positive for the ST398/t034 spa type that is most common in pigs and swine veterinarians. We have ascertained that this participant has daily contact with the six

horses they own. As ST398 *S. aureus* (including t034) are known to be relatively common in horses, this is the likely origin of exposure. Serum samples continue to be collected from swine veterinarians for Hepatitis E serology. To date, 114 samples have been obtained, including from 57 of the 69 subjects, and the target of three samples per subject has been attained for 21 veterinarians. Because three more collection events are planned, we anticipate obtaining over 200 samples, including multiple samples from at least 50 participants (currently 36), which should enable reasonable estimation of seroprevalence and incidence of seroconversion to Hepatitis E virus.

We have not confirmed the presence of influenza virus in quarterly nasal swabs submitted for *S. aureus* culture. Targeted sampling of participants with influenza like symptoms during the winter of 2018/2019 yielded 46 samples for influenza testing, of which four were influenza virus positive. The positive samples are undergoing RNA sequencing for further characterization. This approach will be replicated in the winters of 2019/2020 and 2020/2021. Survey compliance for health events has been excellent (>95%), but interim analysis has not been conducted.

Figure 1: Distributions of *S. aureus* spa types in June 2019 nasal swab samples of swine veterinarians and companion animal veterinarians (spa types in bold consistent with livestock origin)





Optimizing Assessment of Virus-Containing Particles in Animal Agriculture

Viruses have the potential to be transmitted or to become transmissible through air among animals or between animals and people, or they have potential to develop transmissibility, posing real or potential risks to swine, poultry, and veterinary workers. Animals in agricultural facilities generate virus-containing particles from their respiratory tracts or from their fecal matter. Many of these particles are small enough to be transported substantial distances. Few measurements have been made of the airborne concentrations, sizes, and infectivity of these virus-containing particles. Particle size is especially important because it helps to determine how far virus-containing particles can travel through air, where virus-containing particles deposit in the human respiratory tract, and technologies that can remove the particles from air. The objective of this research is to identify or develop a high-volume, field-portable, size-differentiating viral aerosol sampler and use it to measure worker exposures to live airborne influenza viruses in animal agriculture facilities.

The first step in this research was to assemble a wide range of existing samplers that collect airborne particles by a variety of principles, and to test the samplers side-by-side in an isolation room using artificially generated influenza virus aerosols. The aim for these tests was to determine the types of samplers that collect the greatest quantity and measure the highest airborne concentrations of viral RNA and live virus. Samples were analyzed to determine quantities of live virus, using isolation techniques, and total virus, using RT-PCR. Findings indicated that higher virus titers and more RNA copies are recovered from high flow rate samplers than from low flow rate samplers, likely because high flow samplers consolidate their samples more than low flow samplers. On the other hand, the highest airborne virus

concentrations were measured by lower flow rate samplers, suggesting that sample consolidation may cause greater inactivation of virus and damage to viral RNA. Additionally, results suggest that impingers may keep viruses live more effectively than other types of samplers. These results suggest to us that a two-sampler strategy may have benefits during outbreak investigations. One sampler might be a high flow, non-sizing impingement sampler for detection of virus; the second sampler might be a lower flow, size-separating impingement sampler for concentration measurements.

The second step of the research, which has been the focus of the past year's activities, has been to design a novel size-separating impingement sampler. Our approach is to develop a multi-stage virtual impactor system that concentrates particles in different size intervals and collects them in impingement samplers. Inertia is the most practical way to separate particles for analysis by size. A virtual impactor consists of an acceleration inlet nozzle and two outlets: a collection probe which draws away a minor portion of the incoming flow – usually about 10% -- and a bypass outlet which draws away the remaining major portion of the incoming flow, which turns 90° from its original direction. Airborne particles are accelerated through the inlet nozzle with the incoming air and directed towards the collection probe. Larger particles with enough inertia are separated in the probe, concentrated, and carried away with the minor flow while smaller particles follow the turning air and are carried away with the major flow.

The sampler that we are designing will contain a series of stages with progressively smaller nozzles placed in series to process the same aerosol flow, with the particles separated by size into several samples that can be collected and analyzed individually. We plan to separate particles into at least four aerodynamic size intervals ($>10\text{ }\mu\text{m}$, $3\text{--}10\text{ }\mu\text{m}$, $1\text{--}3\text{ }\mu\text{m}$, and $<1\text{ }\mu\text{m}$) using a series of virtual impactors. We are still determining if we will include a virtual impactation stage that separates particles $0.3\text{--}1\text{ }\mu\text{m}$, in which case the last interval would be $<0.3\text{ }\mu\text{m}$. Our plan is to collect particles using aerosol impingers such as an AGI-30 or SKC Biosampler. The final stage will be collected using a gelatin filter. The sampler is currently planned to have an incoming flow of 150 L/min.

The multi-stage virtual impactation sampler is being designed using Ansys computational fluid dynamics (CFD) modeling software. The steps needed to design the size-separating impactor sections are to draw the geometry of each section in three dimensions, lay out a three-dimensional mesh within the geometries, model the airflow throughout the mesh, and superimpose particle motion into the airflow. Design parameters will be adjusted to achieve the desired size separation with aerodynamic diameters of $10\text{ }\mu\text{m}$, $3\text{ }\mu\text{m}$, $1\text{ }\mu\text{m}$, and, if we decide to use five stages, $0.3\text{ }\mu\text{m}$. Initial values, taken from the scientific literature, indicate that $10\text{ }\mu\text{m}$ particle separation will be achieved with 2 nozzles approximately 12 mm in diameter, $3\text{ }\mu\text{m}$ separation with 12 nozzles of 2.9 mm in diameter, $1\text{ }\mu\text{m}$ separation with 36 nozzles of 0.97 mm in diameter, and, if we decide to use five stages, $0.3\text{ }\mu\text{m}$ particle separation with 36 nozzles that are 0.46 mm in diameter. Subsequently, a sampler will be fabricated according to the design developed with CFD modeling by the University of Minnesota College of Science and Engineering Machine Shop. The performance of this novel sampler will be verified in laboratory tests and compared to existing samplers in laboratory and field tests.

Rural Firefighters Delivering Agricultural Safety and Health (RF-DASH)

Year 3 of the [RF-DASH project](#) the team supported our existing trainers and expanded their networks of influence. We tracked data on power of their role in the community through a social network analysis tool and semi-structured interview instrument. We also assessed the feasibility of a national, multi-region program through a national training pilot.

Social Network Analysis: With 36 trainers, we have conducted social network analysis interviews with 19 trainers. We have initiated second round interviews and have begun incentivizing individuals to discuss the work they have done with RF-DASH. We are currently analyzing and evaluating the data already collected and will continue to conduct more interviews approximately every six months to see how information about the RF-DASH program moves through their social networks.

National Training Pilot: We reached out to three active National Fire Protection Association (NFPA) committee members to see if the project can become part of an existing standard for rural fire/EMS departments to follow or a new standard altogether. Receiving positive feedback, we decided to pursue a national training pilot to evaluate if the project was generalizable enough for other regions around the United States.

The national training encouraged partnerships between agriculture health and safety professionals, and rural fire/EMS. We invited 18 individuals from nine states (Idaho, Minnesota, Nebraska, New York, Ohio, Pennsylvania, Utah, Washington, and Wisconsin) to Minneapolis, MN for two days of training and a round table discussion about ways to improve the project in a national program. We received positive feedback on the entire RF-DASH project. During the round table discussion, participants provided suggestions and new ideas to improve the overall use and appearance of the program through marketing, further curriculum refinement, and digital tools. We will be following up with the group in six months to learn what they took away from the program and implemented in their regions. The NFPA committee members informed us we are already following many of the standards, specifically the 1300 standard regarding community risk analysis and reduction. This may mean firefighters can be further incentivized to engage with the program to have their departments compliant with this standard.



Curriculum Refinement and Digitalization: In continuing our goal to support existing trainers, RF-DASH team created resources to increase communication from the project staff, participant members, rural fire/EMS, and farmers. Development of the quarterly RF-DASH newsletter has allowed participants to become more engaged and up to date on the progress of the project. Many enrolled rural departments provided positive feedback on the effectiveness of this communication tool.

We created a brochure to give information on RF-DASH to farmers. This was in direct response to requests from fire/EMS personnel on additional resources to help inform farmers on project goals. In addition, we built a contact directory representing all of the individuals in the RF-DASH program. This public directory will allow the public to contact individuals in their regions about RF-DASH.



Improving Digital Tools: We revised the item rating scale (1-5) in [SaferFarm.org](https://saferfarm.org) to stay consistent with best practices in hazard analyses. Now, five represents optimum protection against a hazard and one represents the least protection. The FARM-HAT scales were also revised and underwent general refinement, including incorporation of the ability to make future revisions as needed. We also updated SaferFarm.org to include a Forms Library to house the updated 154 FARM-HAT sheets.

Google Analytics was added to SaferFarm.org to provide the RF-DASH team with data on how users find and utilize the website.

Other Outcomes: The RF-DASH project was featured in Canada's [Western Producer](#) trade magazine discussing uses of the digital tools and how farmers can help firefighters prepare and respond to farm emergencies. [Dairy Radio Now](#) also conducted a short interview on the background and goals for the project.

Next Year: The next year of RF-DASH will consist of supporting our existing trainers, observing how their networks expand, as well as continuing to build a national program. We will be continually working on improvements to online tools and curriculum. We plan to contact a marketing company with previous experience assisting NFMC to discuss ways to create a consistent and professional appearance for RF-DASH.

Promoting Safety and Worker Health for Immigrant Dairy Workers

Project goals:

1. Expand and apply the evidence-based findings from the completed UMASH research project, *Seguridad en Las Lecherías: Immigrant Dairy Worker Health and Safety* to Minnesota dairy operations.
2. Provide evidence-based worker health and safety interventions including general worker health.
3. Train and engage veterinarians to be part of a One Health team for worker health and safety, especially as it pertains to safely working around dairy cattle.

Highlights from this year:

- Partnered with Community Health Services Inc. to provide health screenings, health services, safety and health information to dairy workers, farmers and their families. This is done in conjunction with their mobile clinics on dairy farms in SE Minnesota.
- Recruited additional dairy farms for health and safety training. Eleven farms are enrolled with 144 workers.

- Engaged veterinarians as part of the dairy farm health and safety team. This includes developing and field testing a safety audit tool for veterinarians to assess safe animal handling practices and infectious disease exposures on dairies. This tool is being revised. The revised tool would allow veterinarians to provide tangible farm assessments to producers in a simple, understandable format.
- Revised and updated training and educational materials. This includes developing written training guides for producers on positive animal handling techniques aligning with our current UMASH videos. This offers an additional training tool for producers. Items incorporated for worker training by producers include learning objectives, teaching activities, and post-training assessment options.
- Engaged community and industry leaders to raise awareness and support farm recruitment. This includes dairy inspectors, dairy supply sales, nutritionist, etc.

Next year's activities:

- Continue to recruit dairy farms.
- Further integrate and engage veterinarians into the health and safety team.
- Partner Veterinary Public Health Residents with Industrial Hygiene graduate students to develop and field test a Safety audit tool for dairy producers.
- Integrate mobile health promotion clinics with existing health structures to support continued care of workers including mental health assessment and resources. Seek additional funds to support mental health resources for immigrant dairy workers in combination with Community Health Services Inc. and Migrant Clinicians Network.

Assessing and Preventing Work Related Injuries in Animal Agriculture

Occupational injury in animal agriculture affects not only the health and well-being of workers, but is a significant burden to the agriculture industry due to lost productivity and compensation costs. There is significant interest in reducing the burden of injury, however the tools available for specific injury prevention activities are limited. People working in the animal agriculture industry may encounter a number of health and safety risks on a daily basis. Contact with animals, working on uneven and slippery surfaces, repetitive motions in ergonomically compromised positions, and using powered machinery, are examples of routine hazards. In addition to the potential injury risks, the amount of lost work time, lost productivity, and increased medical and operational costs present a significant burden to the industry. To properly characterize the burden of injury, identify opportunities for prevention, and evaluate progress in controlling injury requires systematically collected data that can link injury events to information characterizing risk. Identifying the most common and severe injuries is the first task in an injury prevention program. Developing specific strategies to prevent injuries requires an understanding of the underlying determinants of the injury. To accomplish this goal, we are engaging our industry partners and people with expertise in animal agriculture to identify how specific injuries might be prevented, high-impact dissemination, and accelerated implementation of interventions in at-risk populations

In the last year we have continued to examine aggregated data from our pork industry partners and worker compensation carriers. Utilizing data from companies and insurance carriers

provides unique opportunities and challenges, but will ultimately offer a more comprehensive picture of injury risks to workers and burden to employers. Through these efforts we are identifying and describing major injury problems and potential causes of these injuries. We continue to focus on needlestick injuries and animal interaction injuries in swine operations and have manuscripts being prepared for each topic. There are some notable findings that we will further explore with our partners.

Needlestick injuries are not frequent, but can result in serious complications. From both company and insurance claims data we note that these injuries can be costly and result in substantial time away from work. Moreover, contrary to some beliefs, there is a considerable risk of injury to workers who are using needleless injection systems. We have limited data comparing these types of injuries, but it appears injuries from needleless systems result in higher average compensation costs and time away from work. The type of medication used may contribute to this difference. Another observation is that workers injured by both needlesticks and through an animal interaction have less experience than those with other types of injuries. Animal interactions are the most common cause of injuries, but may have a wide range of causes. We have directed our efforts toward identifying scenarios where the injuries that do occur may have been prevented with improved animal handling skills. We believe this will guide future development and implementation of tailored in-service animal handling training as a means to reduce injuries and improve the care and welfare of the animals. Our investigation has spearheaded our recent outreach and training efforts with the National Pork Board on sow handling as an important training tool for swine human resource officers and prevention of animal interaction injuries. Finally, through text analytics of the worker compensation data we have identified power-washing related injuries as an area of focus for the coming year.

We continue to recruit both swine and dairy operations. We anticipate that our efforts to understand the reporting of injuries in animal agriculture will also facilitate evaluating efforts to implement any prevention protocols.

SECTION III: OTHER PROGRAM & ACTIVITY HIGHLIGHTS

Emerging Issues Program

The goal of the Emerging Issues Program is to identify and respond to emerging or re-emerging issues that may impact the health and well-being of the agricultural workforce and their families. During the past year, UMASH has focused this program on two emerging issues affecting agricultural worker health and safety: 1) stress and mental health and 2) manure management.

Emerging Issue 1: Stress and Mental Health

Stress, depression, and suicide and lack of resources continues to be a concern in agricultural communities, where economic, social, and environmental forces challenge the health and safety of farmers, agricultural workers and their families. Following the UMASH 2018 Annual Forum [“Building Resilient Agricultural Communities”](#) UMASH funded three projects to build partnerships and programs in the region to address stress and mental health issues among agricultural workers. In addition, UMASH engaged a mental health practitioner to develop a [Signs and Symptoms of Stress](#) resource card (see below) that provides guidance for how to recognize the physical and behavioral signs of stress in oneself or others and seek help. This resource has been well received by agricultural groups and media and has been widely shared at outreach events and on-line. The card (available in English and Spanish) is customizable and has been co-branded by several groups both locally and across the US for dissemination through their organization and networks.

SIGNS AND SYMPTOMS OF *STRESS*

BEHAVIOR SIGNS

- ✓ Worrying about things you didn't worry about before
- ✓ Loss of interest in things you used to enjoy (hobbies)
- ✓ Poor concentration, confusion; forgetfulness
- ✓ Uncertainty or trouble making decisions
- ✓ Relationship problems
- ✓ Sad mood
- ✓ Feeling anxious
- ✓ Change in personality, irritability
- ✓ Negative thinking
- ✓ Wanting to withdraw from people and activities
- ✓ Increased smoking/drinking

WHAT CAN YOU DO?
See the back of this card for help and suggestions - for you or someone you know!

PHYSICAL SIGNS

- ✓ Poor or disturbed sleep
- ✓ Weight loss or gain
- ✓ Changes in appetite
- ✓ Stomach or gastrointestinal problems
- ✓ Clenching or grinding teeth
- ✓ Chest pain
- ✓ Poor hygiene

National Suicide Prevention Line: 1-800-273-8255
It's free, confidential and open 24/7

Revised April 2019

UMASH Upper Midwest Agricultural Safety and Health Center
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ADDITIONAL REGIONAL AND NATIONAL RESOURCES AVAILABLE AT:
umash.umn.edu/stress

SIGNS AND SYMPTOMS OF *STRESS*

WHAT CAN YOU DO?

Do you recognize the signs and symptoms in yourself or someone you know?

YOURSELF

- ✓ Reach out to a loved one. Talk about how you are feeling.
- ✓ Talk to your friends, clergy, or medical provider.
- ✓ Reach out to a mental health counselor.

SOMEONE YOU KNOW

- ✓ Listen attentively and without judgement. Try to understand where they are coming from.
- ✓ Share your concerns about his/her behavior, mood, appearance, etc. Ask questions about changes you observe.
- ✓ Encourage them to reach out/tell a family member.

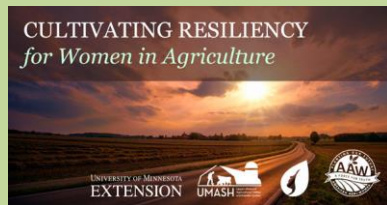
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ADDITIONAL REGIONAL AND NATIONAL RESOURCES AVAILABLE AT:
umash.umn.edu/stress

Stress & Mental Health Featured Project:



[Cultivating Resiliency for Women in Agriculture](#) is an innovative webinar series that sets out to help women cultivate resiliency by focusing on what they can control in challenging times and connecting them with resources and information that can help them weather stress.

- Created new partnership between American Agri-Women, Minnesota District 11 Agri-Women, University of Minnesota Extension, and mental health experts in greater MN
- Project team organized/hosted monthly webinars from Dec 2018 - July 2019 reaching 1060 people in all fifty states, the District of Columbia, and four Canadian provinces.
- Leveraging other funding, project is continuing to host monthly webinars on new topics and have launched occasional virtual 'coffee chats' to foster conversation
- Webinars and handouts are archived on UMASH website for on-demand access
- Webinars have been well-received by the participants who have shared comments such as: *"I really felt like I am better equipped to manage and adapt my own self-care plan."*
- The webinars have been widely promoted by agriculture and media organizations; and presented at several regional and national conferences.
- Over 300 women were surveyed for project of which *"90% said they experienced stress related to agriculture."* Additional [project highlights](#) can be found on the website.

Stress & Mental Health Featured Project:



[Stress and Mental Health Conversations with Gear Up for Ag Health and Safety](#) focuses on educating the next generation (college-age students) about agricultural health and safety. UMASH funding enabled this existing program to expand to include stress and mental health resources and assist college students in recognizing signs and symptoms of stress and mental health issues in themselves and also peers and family members.

- Funding supported the development of a motion graphic video, a module on stress and mental health, and new pre/post survey questions focused on stress and mental health
- This program has reached 900+ college agriculture students studying in the US, Canada, Denmark and Sweden since January 2019
- A discussion guide is being developed to facilitate the use of the motion graphic as a conversation starter in rural settings to help build supportive communities in rural settings.

Stress & Mental Health Featured Project:



[Using Stories and Education to Build Resilient Agricultural Communities](#)

- This project aims to change the public perception around stress and mental health in agricultural communities and better equip the community to identify and help people who may be having thoughts of suicide.

- Developed partnerships with community health care, and industry partners.
- We trained 4 individuals with agricultural background as rural suicide prevention trainers
- Our industry partner, Land O Lakes, hosts a suicide prevention training throughout greater Minnesota called *Query, Persuade, Refer* (QPR). Thus far, our project has trained 4 QPR trainers and conducted 6 QPR training sessions that reached over 235 participants. Additional training sessions are scheduled for November and January.
- We are collecting personal stories of farmers or farm families willing to share their story of living with a mental illness or being a suicide loss survivor to promote awareness and reduce stigma. Stories will be shared on [TellingTheStoryProject.org](#) which is a collaborative outreach project between UMASH and two other US Ag Centers in the Upper Midwest.

Emerging Issue 2: Manure Management

The Upper Midwest experienced a number of severe injuries and fatalities in the last few years related to the management of manure from animal agriculture operations. Following discussion with our advisory committee UMASH began a review of recent incidents across the country and a review of the literature related to occupational hazards of manure management, which includes collection, storage, transport, and application of manure. The potential hazards from manure have been known for decades, but as the industry changes and more comprehensive and complex manure management takes place, we decided it was an appropriate time to examine emerging occupational hazards in the industry. The focus of this year's activities includes working with University of Minnesota Extension to better understand the issues and risks for manure applicators. With Extension's involvement we have reviewed previous evaluations from training exercises and updated the survey for the next year's application training sessions. Also, with heavy rains and potential flooding UMASH has worked to update and provide resources including key contacts for our regional partners if a spill were to occur.

Outreach and Engagement

Throughout the year, UMASH outreach staff at the University of Minnesota (UMN), the National Farm Medicine Center (NFMC) and the Minnesota Department of Health (MDH) engage with agricultural audiences, researchers and others at a variety of farm shows, meetings, conferences and other stakeholder events across the region. Many of these events are highlighted on our website ([In the Field](#) section).




Minnesota Farmfest

This year UMASH had the privilege of co-sponsoring and organizing a new [Wellness and Safety Pavilion at Minnesota Farmfest](#), a farm show that connects approximately 30,000 attendees and 450 exhibitors over three days. This year's event took place August 6-8th in Morgan, Minnesota. In previous years, Farmfest has had very little focus on health and safety. After successfully laying out a plan for the show organizers, UMASH organized, recruited and engaged over 25 organizations to participate as exhibitors, safety and rescue demonstrators, and health screening providers. Farm Bureau Financial Services was the major sponsor and underwrote the cost of space, furnishings, and exhibitor/staff entrance fees. Additional support was provided by the Minnesota Department of Health, Minnesota Department of Agriculture and UMASH.



Feedback from show attendees and exhibitors was overwhelmingly positive. Traffic to the area was steady throughout the show and attendees were engaged, interested and many voiced their appreciation regarding the presence of health and safety resources. Many exhibitors who are based in the Minneapolis-St Paul metro area, including several from the University of Minnesota, were particularly grateful to have this opportunity to engage with rural and farm audiences and also reported the event to be a valuable professional networking experience allowing them to connect with other organizations who were exhibiting in the tent.

Farmfest Outreach Activities

 SAFETY AND RESCUE DEMOS	 FREE HEALTH SCREENINGS	 WELLNESS AND SAFETY TENT
<ul style="list-style-type: none">✓ Grain Bin Rescue✓ Tractor Rollover✓ ATV Simulator✓ Power Take-off (PTO)✓ Safety	<ul style="list-style-type: none">✓ Blood Pressure✓ Body Mass Index (BMI)✓ Glucose✓ Cholesterol✓ Skin Cancer Screening	<ul style="list-style-type: none">✓ Healthy Living, Prevention, Research✓ Mental Health and Resiliency✓ Youth and Family✓ Rural equipment and Roadway Safety✓ Business Safety✓ Emergency Response✓ Other safety topics

FARMFEST OUTREACH HIGHLIGHTS

- 36 demonstrations over three days
- 900 attendees (youth and adults) watched the demos
- 189 people received basic health screening
- 50 people were screened for skin cancer
- 20+ exhibitors engaged attendees and offered resources
- 1200 opioid/drug deactivation kits first aid supplies distributed
- 200+ people visited the RALI Code3 trailer on drug awareness

NORA Symposium: Stressed Out from Work: An Occupational Hazard



In May 2019, UMASH partnered with the Midwest Center for Occupational Health and Safety (MCOHS) to co-sponsor the annual [NORA Symposium: Stressed out from work: An Occupational Hazard](#) and addressed the challenges of stress and mental health problems that result from work. Three panelists, representing agricultural producers, firefighters and veterinarians shared their own unique perspectives of the impact of stress in the workplace and the resulting adverse effects. The Symposium also provided an opportunity for UMASH researchers and pilot project grantees to present posters on their research.

UMASH Forum: Antimicrobial Resistance in Agriculture: Is it a Worker Health Issue?



In September 2019, the [UMASH Annual Forum: Antimicrobial Resistance in Agriculture: Is it a worker health issue?](#) was held and brought together a multidisciplinary group of researchers, veterinarians, government and others to explore this issue. This half-day forum featured five presenters from Iowa, Minnesota, South Dakota and Wisconsin who shared information about AMR related to agriculture which was followed by small group discussions. A call for partner project proposals is forthcoming. Events like this are another way that UMASH builds partnerships and connects with stakeholders regionally and across sectors and disciplines.

Fun on the Farm: Agritourism Workshop

In April 2019, UMASH staff at the Minnesota Department of Health (MDH) conducted the eleventh evening workshop, **Fun on the Farm: Agritourism Workshop**, for people with agritourism operations (petting zoos, apple orchards, pumpkin patches, corn mazes, etc.) to educate them on best practices for safe human-animal interactions. Over 500 people have been trained since 2016, either in person (360) or by completing the Safer FACEs online certification program. The next workshop will be held in mid-November.

These workshops have resulted in some amazing partnerships between the MDH and farm operators. Following the April 2019 workshop, staff from a Minnesota based 20 farm co-op quickly took action to design and implement significant changes to ensure the safety of visitors touring the member farms during their September 2019 Farm Tour.

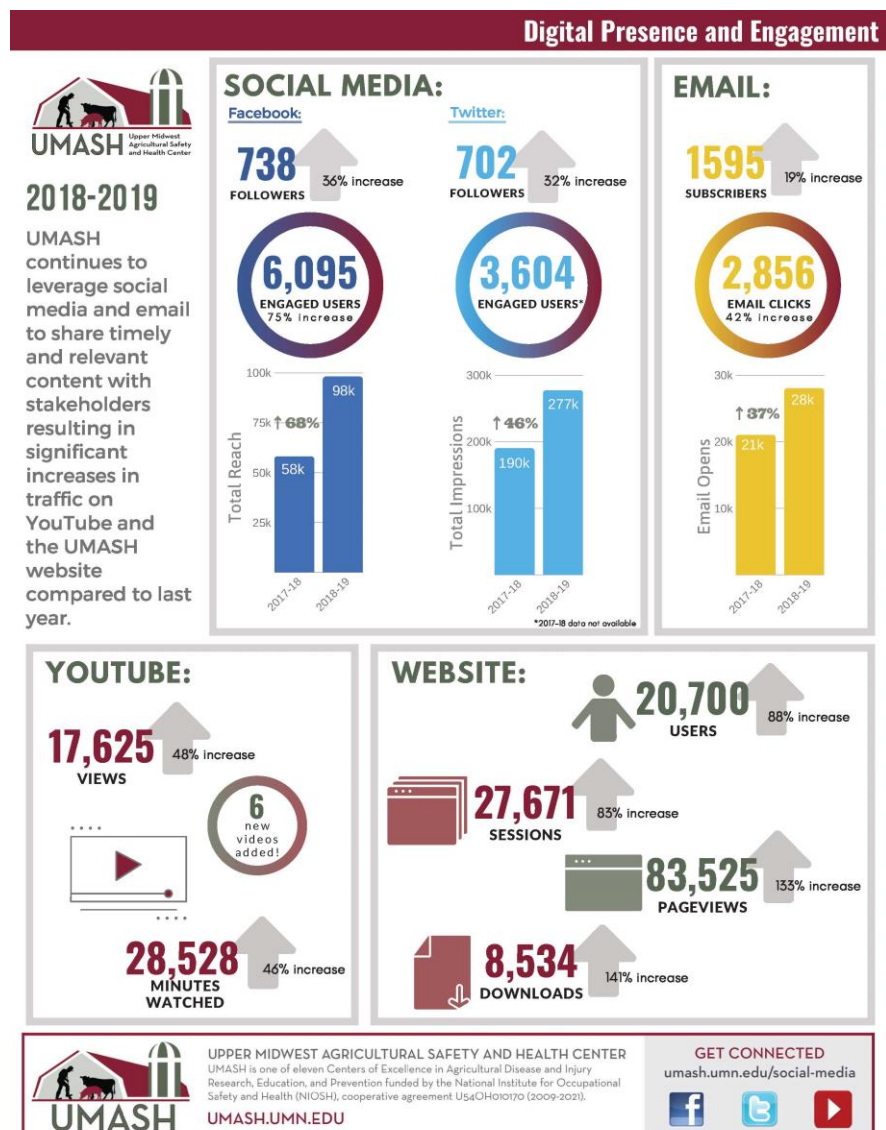
- Co-op passed a resolution requiring training and use of Best Practice checklist by all member farms
- Created new co-branded signage and handwashing posters adapted from UMASH agritourism resources
- Obtained outside funding to build and installed handwashing stations at each farm
- Plans are underway to translate the handwashing instructions into 18 languages to be made available at each farm location and through the UMASH website.
- Will be a presenter at the November 2019 Agritourism Workshop

Digital Presence and Engagement

UMASH continues to leverage new technology and digital platforms to grow our reach and engagement with agricultural health workers.

Digital outreach platforms include:

- [UMASH website](#)
- [UMASH YouTube](#)
- [USAgCenters YouTube](#)
- UMASH [Facebook](#)
- UMASH [Twitter](#)
- Weekly [emails](#)
- [UMASH Connection: Farms and People](#) quarterly newsletter



Traditional Media Engagement

UMASH engages traditional media outlets to amplify safety reminders and awareness campaigns, promote upcoming events, workshops, webinars, etc., UMASH has been interviewed at agricultural media and farm broadcaster conferences, farm shows, and via radio to provide safety tips and resources. Paid advertisement in print and on-line trade and commodity publications are also used to reach farmer/producers who may rely on those as a primary source of information for their farm operations.

UMASH Featured Outreach Resources

FARMER STRESS AND MENTAL HEALTH



Through our Emerging Issues Program, UMASH is helping to build resiliency in agricultural communities by bringing together diverse perspectives to understand and address gaps, identify opportunities, and build partnerships for action. Following our June 2018 Annual Forum: Building Resilient Agricultural Communities, UMASH funded three partner projects targeting women in agriculture, college agriculture students, and rural MN communities through awareness building, education, resources and suicide prevention training opportunities. Project highlights and results can be found in the Emerging Issues section of this report and on our [website](#).

LOW STRESS ANIMAL HANDLING - DAIRY



Through collaboration with dairy experts at the University of Minnesota, UMASH produced bilingual training resources (videos and factsheets) on [low stress animal handling for dairy](#) operations to reduce injuries for both animals and the workers.

- 5-part video series, fact sheets and posters (available in English and Spanish)
- Well-received by producers, veterinarians, extension educators and others
- Qualify as ethics training for FARM 3.0
- Incorporated in [Gear up for Ag Health and Safety™](#) college program
- Over 10,000 views on YouTube in the past year (33,500 lifetime)
- Continue to be shared by agricultural organizations, media, and others
- *NEW*: 5-part teaching guides for agricultural educators; developed through a partnership with University of Minnesota Agricultural Education faculty
- Currently developing on-line training guides for producers.

NEW: TRAINING RESOURCES FOR SWINE PRODUCERS



In collaboration with University of Minnesota swine faculty and the National Pork Board, UMASH recently completed two new videos as [training resources for swine producers](#) to address concerns about working with sows and preventing disease transmission in swine facilities.

- 2 new videos recently uploaded to YouTube: [Moving Sows – Safe and Smart and Protecting Pigs and People from the Flu](#). (Available in English and Spanish.)
- Currently developing on-line training guides for producers. [Farm Safety Check \(FSC\)](#): The FSC resource

PREVENTING NEEDLESTICK INJURIES



UMASH identified a need for education and training resources to decrease needlestick injuries in animal agriculture. In collaboration with two large swine and dairy facilities, UMASH produced bilingual videos, factsheets and posters on [needlestick prevention](#) for training workers.

- Resources are widely used by producers, Extension educators and others
- Well-received and shared by industry and agricultural media.
- Included in a field training resource delivered on iPads to 1,400+ dairy workers
- Included in the [Gear up for Ag Health and Safety™](#) college program
- Recommended resource by WI OSHA for the Dairy Local Emphasis Program
- Videos are Included in a proprietary training portal by a large insurer in California.
- Factsheets have been co-branded by major insurance provider
- Over 850 views on YouTube in the past year (6,229 lifetime).

AGRITOURISM: KEEPING PEOPLE SAFE ON THE FARM



Through our collaboration with the Minnesota Department of Health, UMASH is working to keep visitors safe on the farm by producing [agritourism training and awareness resources](#) and conducting workshops for agritourism operators to prevent injury and illness at animal contact venues.

- 3 agritourism safety videos – 2,300+ views in the past year (5,298 lifetime)
- 2 new educational videos aimed at 4H students – 573 views to date (new in 2019)
 - 6 Tips for Biosecurity – A Guide for Youth Livestock Exhibitors
 - Keep Food Safe – 4H Food Stand Worker Safety
- Bilingual handwashing posters and education brochure
- Best Practices for Animal Contact Checklist
- Awareness posters, factsheets
- Agritourism workshops – 360 people trained to date. Next workshop in Nov 2019)
- Safer FACEs on-line voluntary certification program – 150 people have completed

FARM SAFETY CHECK - MONTHLY SAFETY TOPICS



Safety and health can be overwhelming with the number of hazards on the farm. The [Farm Safety Check \(FSC\)](#) resource was launched as an outreach tool to provide monthly checklists that farmers can use to identify and remedy common hazards on a range of topics. Each FSC is shared via email, social media and the UMASH website.

- 10 new checklists published this year (28 total since 2017)
New topics included: hearing protection, manure application, skid steer safety, sharps handling, safe digging, tick borne disease, hay and silage storage, Worker Protection Standard, and tractor safety.
- Downloadable checklist is now a fillable PDF that user can complete electronically
- Well received and frequently shared by agricultural groups and media outlets who have provided positive feedback.
- Highly accessed resource on UMASH website: 11,400+ page views and 535 FSC checklist downloads in the past year (18,957 page views/849 downloads lifetime)

IMMIGRANT DAIRY WORKER TRAINING CURRICULUM



The [Dairy Worker Training Curriculum](#) developed through a partnership with the Migrant Clinicians Network for the *Seguridad en las lecharías* research project is an enduring resource that continues to be accessible to dairy producers who employ Spanish speaking workers.

- OSHA approved, award winning 5-module curriculum uses a train-the-trainer approach and includes facilitator guides, resources and visuals for workers with limited formal education and low literacy levels.
- Used to train 836 workers on 67 farms in MN and WI (2011-2016)
- Requests for curriculum from 50+ organizations in the US and beyond
- Curriculum being reviewed and updated for the [Promoting Safety and Worker Health for Immigrant Dairy Workers](#) in MN
- Partnered with Minnesota Milk Producers Association to deliver the informational webinar to producers about the curriculum and how they can access and use it on their dairy operation
- Agrability for Africa will use the *Seguridad* health and safety training materials to promote health and safety across Africa.

TELLING THE STORY PROJECT



UMASH, the Great Plains Center for Agricultural Health (GPCAH) and the Central States Center for Agricultural Safety and Health (CS-CASH), have collaborated on an innovative outreach initiative, “[Telling the Story Project](#)” turning farmers’ first-hand stories about close calls and fatalities into teachable moments.

- Website currently hosts 11 multi-media stories with prevention messages aimed at farmers, agricultural workers, communicators, educators and policy makers.
- New stories are in process and will be shared with agricultural media and on social media.
- Project has received extensive media attention in mainstream and agricultural media across the Midwest in print, online and by broadcast media.
- Discussion guides based on the stories are available and can be used by educators, 4-H and FFA leaders, managers and others looking to start a positive conversation about safety. *Classroom agriculture teachers reported that the guides were helpful and practical* (e.g., can be given to substitute teachers to provide content for the day’s class).
- Project has been presented at a number of national and international conferences over the past year.

AG HEALTH AND SAFETY SPOTLIGHT STORIES



Throughout the year, UMASH publishes [Ag Health and Safety Spotlight Stories](#) to highlight new resources, events, and people or organizations doing important work in the field of agricultural safety and health. Twenty-seven (27) new stories were published in the past year (82 lifetime).

These stories have become a very popular feature on our website and are frequently shared by our emails subscribers resulting in nearly 10,000 page views related to the Spotlight Stories in the past year (15,868 lifetime). Our efforts to produce and share these stories is strengthening relationships and building new connections with health and safety colleagues across the Upper Midwest and beyond.

Evaluation

UMASH Center leadership places a priority on evaluation and strategic planning activities that promote thoughtful decision-making, targeted use of resources, and continuous improvement. During the past year, our evaluation efforts focused on supporting outreach activities and our emerging issues projects.

Outreach Evaluation support

Monitoring and evaluation support for UMASH outreach activities consists of monitoring and analyzing digital engagement. Our evaluation team has created a number of custom dashboards to help UMASH monitor and improve its communication and outreach activities. An infographic, “UMASH Digital Presence and Engagement Results for 2018-2019,” is included in the Outreach section.

In addition, the evaluation team is refining the UMASH Outreach Reporting Tool that is used to gather and report information about outreach activities across the center and is used by UMASH leadership for administrative and outreach planning, reporting, and decision-making. Finally, we are currently exploring new methods for capturing the impact of our many research and outreach activities in a more systematic way.

Emerging Issues Project Evaluation Support

The evaluation team continues to work closely with UMASH leadership on the Emerging Issues program. Previously, the evaluation team designed a 3-step model to identify emerging issues in national farm safety and health in the US Midwest Region that could be funded for community-university action using UMASH emerging issues funds. The model includes: (Step 1) scan the environment for new and trending issues and prioritize a few feasible project ideas to address the issue; (Step 2) design, plan, and fund an intervention project (e.g., a pilot intervention or educational outreach campaign); and (Step 3) create a timeline of benchmarks tied to project goals and anticipated outcomes and evaluate the project(s) process and outcomes. This model has provided a valuable framework for determining which issues are selected for funding each year.

In the past year, we continued to monitor and evaluate the results of the 2018 UMASH Forum and the three funded partner projects addressing stress and mental health in agriculture. Emerging issues project staff have frequent contact with partner project leads to obtain updates about project results and outcomes.

Evaluation staff are also assisting with survey design for the manure applicator survey to be implemented in the coming year.

Other Center Activities

Minnesota Farm Safety Working Group

UMASH participates in the Minnesota-based farm safety working group with state agencies, professional farm organizations, Extension, agribusiness and others. This initiative led to MN State Legislature funding the [Minnesota Rollover Protection System \(ROPS\) Rebate Program](#). The group continues to meet 1-2 times each year to discuss current issues and opportunities for collaboration.

US Agricultural Safety and Health Center Collaborations



UMASH collaborates with the other ten NIOSH-funded Ag Centers throughout the year and participates in bi-monthly calls with the Evaluation, Outreach and Coordinators (ECO) group to discuss, plan and implement multi-center collaborations on evaluation and outreach initiatives. This working group has resulted in stronger connections and collaboration across the US Ag Centers.

Each year, UMASH participates with the other ten U.S. Agricultural Safety and Health Centers (US Ag Centers) to collectively promote farm safety and share resources during two national awareness events: [Agricultural Safety Awareness Program \(ASAP\) Week](#) in March and [National Farm Safety and Health Week \(NFSHW\)](#) in September.

In response to growing concerns about the lack of resources and support for farmers, farm workers and families who are facing difficult economic conditions and higher rates of suicide in rural and agricultural communities, UMASH also collaborated with the Ag Centers to plan and implement a [Mental Health Awareness](#) campaign in May 2019. The goals were to raise awareness about stress and mental health, create a dialogue to help reduce stigma associated with mental health illness, and provide resources for recognizing symptoms and how to respond. UMASH was a key partner having funded the Cultivating Resiliency project that hosted an extra webinar in May specifically as part of this campaign. Additionally, the UMASH Signs and Symptoms of Stress resource was widely shared as part of this campaign. UMASH continues to actively participate in the US Ag Centers Awareness and YouTube work groups that develop and implement these collaborative agricultural safety awareness campaigns.

UMASH continues to partner with the other US Ag Centers on the [US Ag Center YouTube channel](#) with more than 125 education and training videos (21 from UMASH) on a wide range of agricultural safety and health topics (many in Spanish). This channel provides an enduring resource that can be targeted to specific occupations, education levels, language and culture and provide 24/7 access to information. The channel was designed to reach a new generation of agricultural workers and producers with agriculture, forestry and fishing health and safety videos. Videos are produced, maintained, and monitored by AFF Center personnel. Content experts review each video. Guideline documents assure quality and consistency. Analytics and other topics pertaining to the channel are discussed during monthly teleconferences.

The US Ag Centers YouTube channel has proven to be a widely used resource since it was launched in 2013. The channel is widely promoted throughout the year with selected videos highlighted in awareness campaigns, e.g., Ag Safety Awareness and National Farm Safety and Health Week.

US Ag Center YouTube Stats

This Year (vs. Lifetime)

- 52,900 views (229,800 total)
- 226,100 minutes watched (663,800 total)
- 224 new subscribers (1,110 total)

UMASH frequently collaborates with the Great Plains Center for Agricultural Health (GPCAH), the Central States Center for Agricultural Safety and Health (CS-CASH), the High Plains Center for Agricultural Health and Safety (HICAHS) and the National Children's Center for Rural and Agricultural Health (NCCRAHS) to share exhibit space, resources and staffing at regional farm shows. UMASH frequently shares resources from across the US Ag Centers that are relevant to our region as part of our Farm Safety Check resource, Spotlight Stories, and on social media.