Summary Annual Report

2019-2020

NIOSH Center of Excellence in Agricultural Disease and Injury Research, Education, and Prevention
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UMASH Upper Midwest Agricultural Safety and Health Center

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Section I: Center Overview

The Upper Midwest Agricultural Safety and Health Center

Background

Two dramatic events have greatly shaped 2020: the COVID-19 pandemic and the global racial tensions displayed after the killing of George Floyd. These events have broadly impacted rural communities and agriculture. Currently, the pandemic is spreading across the Upper Midwest with some of the highest rates of COVID-19 in the country. This translates to lost lives, labor shortages, sick workers, and changing market demands. Many of our rural hospitals are full or have limited resources to respond to this surge in cases.

This pandemic also highlights the interrelatedness of the global food system where everyone is impacted from farmers, grocery stores, feed elevator operators, equipment sales, and a myriad of others in our rural communities. The social and mental health impacts are also great. Instead of a hearty handshake and smile at the local market, we are limited in our social interactions and are often wearing a face mask. This year, as we work to confront the structural and interpersonal mechanisms of racism that impact how we hire, train, and keep workers, we also have a renewed charge to address the health and safety inequities that impact the immigrant farmworkers and farming communities of color in our region. These are complex and difficult issues.

These are new challenges to which the agricultural industry is attempting to respond to meet the global demand for a safe and plentiful food supply that is both affordable and produced in a sustainable manner. Yet, these challenges are added to the ongoing occupational health risks of farming. In particular, 2019 was a difficult year with a number of deaths and injuries due to grain bin entrapments. The changing landscape of issues in agriculture requires us to adapt. We need to understand and manage these issues to protect the health of agricultural workers and their families.

To address these emerging 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. This has been true this year with our focus pivoting to help protect producers, farm families, and workers in how to respond to the COVID-19 pandemic, supporting our rural communities, and helping promote safety and health to farmers, farm families, and farmworkers.

About the 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

complementary 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, human, and environmental health.

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

Background

Agriculture is the foundation of the economy in the Upper Midwest. Minnesota, in particular, 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, but 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 farms and fairs. However, little information is available on how commonly people acquire zoonotic diseases from food production animals, as well as specific on-farm risk factors for acquiring these diseases from food animals.

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

Project update

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 (i.e., living on, working on, or visiting a farm, petting zoo, fair, or another 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.

In 2020, we published findings of this effort from 2012 to 2016 in *Epidemiology and Infection*. Key findings included that 23% (1708/7560) of the enteric disease cases in the study reported an animal agriculture exposure in their incubation period, including 60% (344/571) of *Cryptosporidium parvum* cases, 28% (934/3391) of *Campylobacter* cases, 22% (85/383) of STEC O157 cases, 16% (83/521) of non-O157 STEC cases, 10% (253/2575) of non-typhoidal *Salmonella enterica* cases and 8% (9/119) of *Yersinia enterocolitica* cases.

"Minnesotans who live and work on farms with food production animals had **8x more zoonotic infections** than other Minnesotans."

Living and/or working on a farm accounted for 61% of cases with an agricultural exposure, followed by visiting a private farm (29% of cases) and visiting a public animal agriculture venue (10% of cases). Cattle were the most common animal type involved in agricultural exposures, reported by 72% of cases. The estimated cumulative incidence of zoonotic enteric infections for people who live and/or work on farms with food production animals in Minnesota during 2012–2016 was 147 per 10,000 population, 8 times greater than for other Minnesotans (18.5 per 10,000).

Thus, the burden of enteric zoonoses among people with animal agriculture exposures is far greater than previously appreciated. In total, from 2012-2019, 13,299 laboratory-confirmed illnesses among Minnesotans have been eligible for our study. Of these, 3,032 (23%) reported an animal agriculture exposure in Minnesota in their exposure period (just before they got sick).

MDH also investigates animal-contact related outbreaks. In August 2019, 11 *E. coli* O157:H7 cases, including one with hemolytic uremic syndrome, were identified as part of an outbreak at the Miracle of Birth Center at the Minnesota State Fair. In addition, an outbreak of cryptosporidiosis affected seven members of a community-based professional organization that took a field trip to area farms in November 2019 to learn about different sectors of the economy as part of Agriculture Day. We worked with both venues to prevent illness going forward. In 2020, Minnesota was part of a large, nationwide outbreak of *Salmonella* infections associated with live baby poultry contact for the fifth year in a row; 1,325 people from 48 states (including 32 from Minnesota) developed salmonellosis, resulting in 151 hospitalizations and 1 death. We continue to partner with the Minnesota Board of Animal Health to educate both the feed store manager who sells live poultry and the people who purchase them. In July 2020, four cryptosporidiosis cases occurred among veterinary technician students after working with cattle on a farm. Cryptosporidiosis outbreaks among veterinary and veterinary technician students are too common, and we are working with the respective schools on personal protective equipment recommendations to limit transmission.

Adapting to COVID-19

COVID-19 has had a drastic effect on MDH UMASH activities since March. First, the numbers of reported laboratory-confirmed cases of the common zoonotic enteric pathogens were markedly lower than usual from March to June, likely due to decreased health care seeking and/or fewer stool

cultures performed on ill individuals due to the pandemic. For cases that were diagnosed and reported to MDH, many of our screening and UMASH interviews were delayed or not conducted because all MDH staff were deployed to the pandemic response. We don't see this as a huge set-back for our project because 2020 data is less reliable because the pandemic so profoundly impacted health care seeking and testing for diseases other than COVID-19. The main issue with the pandemic response is that it has prevented us from publishing additional papers on our study, which was a major goal for 2020.

On the bright side, MDH was extremely involved in helping the animal agriculture industry respond to the COVID-19 pandemic. Following is a partial list of activities involved in that response:

1. MDH developed guidance for COVID-19 prevention in Minnesota meatpacking plants with the Minnesota Board of Animal Health (BAH) and the Minnesota Department of Labor and Industry (DLI).
2. MDH started outreach to the meatpacking industry before COVID hit Minnesota. We have consulted with 39 swine, turkey, beef, and chicken processing plants remotely about best practices and performed 3 onsite visits. These are 2-way, non-regulatory learning visits, and communications have continued with these plants throughout the pandemic as conditions and guidance have changed.
3. MDH learned a great deal about preventing COVID-19 in meat and vegetable processing plant workers. We are applying lessons learned to other critical infrastructure sectors, and have reached out to transportation, mining, construction, finance, public utility, and distribution companies.
4. MDH developed COVID prevention guidance for animal agriculture workers and for veterinary personnel with BAH and the Minnesota Department of Agriculture (MDA), and has met virtually with 4 swine farms, a dairy farm, and 6 veterinary clinics to go over best practices. We continue to consult with new facilities where >3 COVID-positive employees are identified.
5. Dr. Scheftel presented "Processing Plants and COVID-19: what we are learning about preventing employee illness" at the University of Minnesota Swine Seminar on May 8, and "Minnesota Farmers: Responding to COVID-19" for the AgriGrowth Council on July 21, and for Farm Fest on August 4.
6. The Critical Infrastructure Workgroup (led by Dr. Scheftel) at MDH collaborated with CDC on a publication that has been submitted to *Emerging Infectious Diseases* as a Dispatch: "Coronavirus Disease among Workers in U.S. Food Processing, Food Manufacturing and Agriculture Workplaces."

Looking forward

We will continue to collect enteric disease data in 2021 that hopefully will reflect more representative trends than data collected in 2020, which was limited due to the COVID-19 pandemic. We also will expand on findings of the paper we published this year by performing detailed analyses and

publishing multiple, in-depth pathogen- and issue-specific papers using enteric disease data from 2012-2019.

Longitudinal study of infectious disease risks at the human-swine interface

Background

In this 5-year project, we will compare the rates of self-reported clinical illnesses likely to be related to three zoonotic agents (*Staphylococcus 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). Quarterly sampling and survey collection are being conducted quarterly in March, June, September, and December each year.

Project update

None of the 117 participants has withdrawn from the study, and the group has maintained high compliance (~95%) in sample collection and survey completion. 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.

The COVID-19 pandemic has forced some changes in the execution of the project, which will mostly affect the exposure data for the two viral diseases. Due to the similarity of some clinical signs of COVID-19 to influenza-like illnesses (ILI), in March 2020 participants were asked to desist from submitting swabs for viral isolation when they experience ILI. Collection of blood samples for Hepatitis E serology was conducted at the March 2020 annual meeting of the American Association of Swine Practitioners (AASV) in Atlanta, GA. The original goal to collect blood samples at the Leman Swine Conference in September 2020 had to be abandoned as the meeting was virtual, as is expected to be the case for the 2021 AASV meeting. Therefore, no further samples will be collected for testing for the viral pathogens. At all samplings to date, the prevalence of *S. aureus* (~70%) and MRSA (10-15%) in swine veterinarians has been consistently higher than in the companion animal control group (~35% and 2%, respectively). The MRSA prevalence in swine veterinarians has remained very stable is similar to our prior study in 2013/2014. Due to the closure of our laboratory for several months, the scheduled June 2020 sampling for *S. aureus* was not performed, but the September sampling was conducted and samples are being processed. However, the collection of health-related data by online survey was maintained without interruption. In summary, the COVID-19 pandemic has reduced the number of samples that are available for testing to viral diseases.

So far, this study has seen a **higher prevalence of *S. aureus* and MRSA in swine veterinarians** than in a companion animal control group."

However, for Hepatitis E serology 154 samples had been collected, including multiple samples from around 40% of participants, which should yield a reasonable estimation of seroprevalence. Testing of the available influenza samples is not yet complete but indicates a prevalence of the order of 20% in participants with clinical signs.

Over the course of the project, swabs for influenza detection have been collected from 33 participants with influenza-like illness (ongoing), and have been stored for later processing. Only 3 of the 30 were from companion animal veterinarians, suggesting either a higher risk of ILI in the swine veterinarians or submission bias. To date, submission in the 2019/2020 flu season is lagging 2018/2019 (10 vs. 23) but is ongoing. There was a loss of a single sampling event for *S. aureus*, but this is unlikely to negatively impact the study due to the consistent long-term patterns being observed. The key data on relevant health events in participants was not affected. As reported previously, about 80% of the swine vet isolates continue to be 'livestock-associated' variants commonly found in pigs, and one companion animal veterinarian continues to be consistently positive for the ST398/t034 spa-type that is most common in pigs and swine veterinarians, likely due to exposure to horses.

Looking forward

For the upcoming year, sampling for *S. aureus* and health data will continue until June 2021, and the focus of the project will shift to the analysis of the health data collected over the duration of the project.

Optimizing Assessment of Virus-Containing Particles in Animal Agriculture

Background

Viruses have the potential to be transmitted through the air among animals or between animals and people, posing risks to swine and poultry workers and to 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 at 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 the air, where virus-containing particles deposit in the human respiratory tract, and technologies that can remove the particles from the 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 infectious airborne influenza viruses in animal agriculture facilities.

In the first step toward this objective, we assembled an array of existing samplers that collect airborne particles by a variety of principles. In three groups, we tested samplers side-by-side in an isolation room by allowing them to collect artificially-generated aerosols containing one of three different viruses: swine influenza virus, avian influenza virus, and MS2 bacteriophage virus. These tests allowed us to determine the types of samplers that collect the greatest quantity of virus and those that measure airborne concentrations of viral RNA and infectious viruses most accurately. Samples were analyzed to determine quantities of infectious virus using isolation techniques and viral RNA using RT-PCR.

Project update

During the past year, results from the first group of these samplers have been compiled into a manuscript that has been submitted to a research journal for review. Two additional manuscripts are in preparation using the results from the second two groups of samplers.

As an example of our findings, Figure 1 shows that the highest and most accurate airborne swine influenza virus concentrations were measured by lower flow rate samplers like the AGI-30 impinger, the BioSampler cyclonic impinger, the VIVAS condensation particle sampler, and the NIOSH multistage bioaerosol sampler. The finding that higher flow rate samplers yielded lower airborne concentration measurements suggests that sample consolidation in the higher flow rate

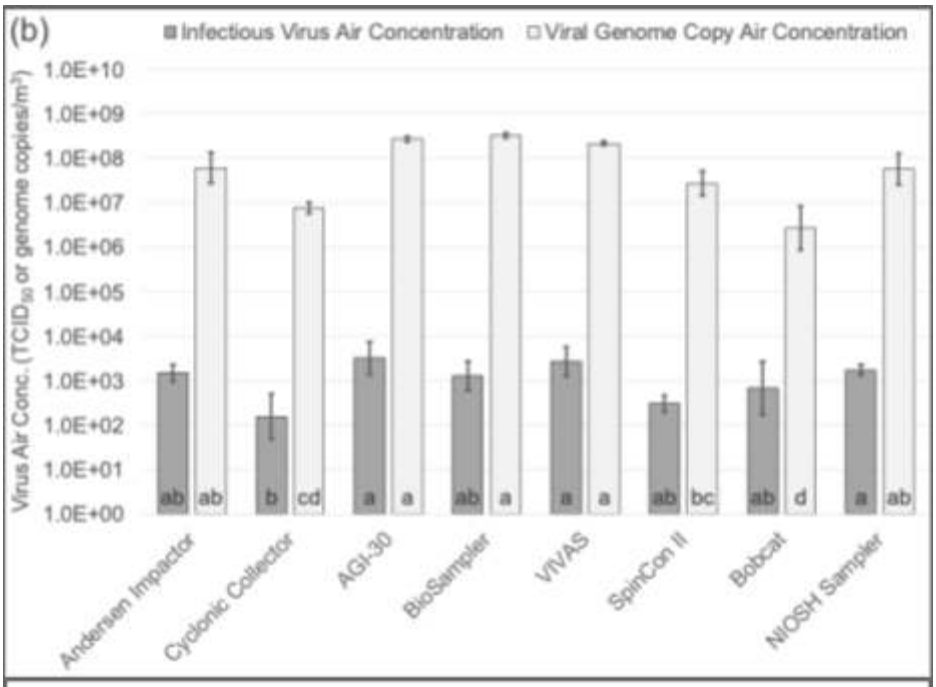


Figure 1. Airborne concentrations of infectious swine influenza virus (dark bars) and swine influenza virus RNA (light bars) measured by several samplers. Bar heights indicate geometric means while error bars represent ± one geometric standard deviation. Same letters indicate geometric means that are not significantly different from one another.

samplers may contribute to inactivation of the virus and damage to viral RNA. On the other hand, higher virus titers and more RNA copies were recovered from high flow rate samplers. These results suggest that a two-sampler strategy may have benefits during virus outbreak investigations. One sampler might be a high flow, non-sizing sampler for detection of virus; the second sampler might be a lower flow, size-separating impingement sampler for concentration measurements.

Using a two-sampler strategy may be helpful during virus outbreak investigations so that one high flow sampler can detect a virus and another lower flow, size-separating sampler can measure the viral concentration.

In early March 2020, field measurements were taken to detect and measure airborne viruses in a swine production facility using a small subset of the most promising samplers. The analysis of these samplers has been delayed by the COVID-19 pandemic. The team hoped to make additional sampling trips to multiple animal agriculture operations afterward, but these trips were postponed due to the pandemic.

In the past year, we have been designing 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 most of the smaller particles follow the turning air and are carried away with the major flow.

Looking forward

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 µm, 4-10 µm, 1-4 µm, and <1 µm) using a series of virtual impactors. We are still determining if we will include a virtual impaction stage that separates particles 0.5-1 µm, in which case the last interval would be <0.5 µm. Our plan is to collect particles concentrated in the minor flows using aerosol impingers such as an AGI-30. The final stage will be collected using a gelatin filter. We plan to have an incoming flow of 300 L/min.

The multi-stage virtual impaction sampler is being designed using Ansys computational fluid dynamics (CFD) modeling software. This is a complicated process that involves drawing the geometry of each section in three dimensions, laying out a three-dimensional computational mesh within the geometry of each section, modeling the airflow throughout the mesh, and superimposing particle motion into the airflow. The design has taken us longer than we originally anticipated. After a

final design is achieved through the CFD modeling, a sampler will be fabricated by the University of Minnesota College of Science and Engineering Machine Shop. The performance of this novel sampler will be verified in laboratory tests. We hope to design and build the sampler and complete the performance validation tests during the next project year, although the COVID-19 pandemic may cause delays in the fabrication of the sampler. After the performance of the new sampler has been validated, it will be compared to existing samplers in laboratory and field tests.

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

Background

The Rural Firefighters Delivering Agriculture Safety and Health (RF-DASH) project is a train-the-trainer program designed to increase rural fire/EMS knowledge and promotion of injury prevention on farms in our local communities. The program expanded beyond the Midwest and has trained over 70 firefighters/EMS in 10 states and in turn, they have begun to train dozens more. Year four of the RF-DASH project supported trainers and expanded their networks of influence through rebranding, development, and refinement of its tools.

Project update

Social Network Analysis and Program Analysis. Social network analysis interviews have continued through year four. However, COVID-19 has affected the ability to conduct interviews with trainers due to the limited time availability of emergency responders. The RF-DASH team has begun coding the social network data and will continue to interview RF-DASH trainers at a later date.

We are also wrapping up and analyzing our six-month follow-ups with national training attendees on their opinions of the program. We are also evaluating how they are implementing RF-DASH within their regions.

WEMSA Training and Application. In November 2019, the RF-DASH master trainers conducted a training through the Wisconsin EMS Association (WEMSA). Thirteen emergency responders from Fire and EMS departments around Wisconsin attended the eight-hour training, covering the five RF-DASH modules and hands-on farm trainings. NBC Channel 15 News conducted interviews with program staff on the importance of connecting rural fire and EMS responders with their local area farmers to reduce hazards on the farm.

Fire Chief and trained RF-DASH trainer, Tim Carey, responded to a farm incident with a milk truck and a tractor collision days after the WEMSA training. Armed with his RF-DASH knowledge, Chief Carey delivered an excellent safety message through the local news on ways to prevent such an incident from occurring. His safety message gained popularity throughout his local community and further signified the media and agricultural community seeing firefighters/EMS as trusted sources of safety information.

Program Rebranding. The RF-DASH team collaborated with a marketing company, named Broadhead, based on feedback from the national training to create a consistent and concise branding message. Using an outside marketing company has allowed the program to obtain a unique perspective on how to better present RF-DASH to target audiences.

Many organizations and individuals contributed their time and expertise to building the program. As all of these organizations have played a part in its success, we wanted to represent these efforts through consistent, visually appealing logos and posters.

Curriculum Refinement and Digitalization. In our continued goal of supporting existing trainers, the RF-DASH team created posters that can be used as a tool to ignite conversations with farmers and first responders. We have also been developing business cards because of the increased demand from trainers to share their contact information.

Improving Digital Tools. Through feedback from RF-DASH trainers on Farm MAPPER, we included lettered icons to allow emergency responders to identify farm buildings and structures in the event of a farm emergency. We also implemented a poisonous gas icon.

Other Outcomes. The nationally recognized agriculture magazine, *Successful Farming*, featured RF-DASH, discussing the five modules of the program and its future. The *Off Farm Income* podcast with Matt Brechwald, a previous police officer and now farmer, also highlighted RF-DASH. The RF-DASH team conducted two virtual presentations at the International Society for Agricultural Safety and Health (ISASH) on the national training and the Social Network Analysis. Lastly, the program released its sixth issue of the growing RF-DASH newsletter that maintains communication with trainers and members on the program's updates and progress.

Looking forward

Year five of RF-DASH will continue to support its existing trainers and concluding observations on trainers' expanding networks through the Social Network Analysis. We will be presenting the program to the Wisconsin Towns Association's (WTA) membership on ways they can use, share, and implement the program within their local communities.

Developing and refining the program's resources will continue with a training manual covering the modules and methods of conducting RF-DASH training. We hope this will better equip our trainers with the necessary resources to continue program expansion, serve as a tool to help assess hazards, and prevent injuries on the farm. We will also continue to improve online tools saferfarm.org and nfmcfarmmapper.com.

As RF-DASH continues to grow both nationally and internationally, we will also be working with the Canadian Agricultural Safety Association (CASA) to implement their own version of the program with a common goal of reducing hazards, preventing farm fatalities, and injuries.

Promoting Safety and Worker Health for Immigrant Dairy Workers

Background

Immigrant workers are important to the economic sustainability of dairy production in the United States. Agriculture is one of the most dangerous occupations. Yet, this population often lacks adequate training due to cultural and language barriers. Our project goal is to improve the occupational health and safety of Minnesota's growing immigrant dairy workforce, by employing a multidisciplinary team of clinicians, veterinarians, producers, workers, and community health centers and applying an overall One Health approach.

Project update

This year, we recruited additional dairy farms for health and safety training. Thirteen farms are enrolled with over 200 workers. The farms are located at various locations throughout the state including southeast, central, and northwest Minnesota.

We also engaged community and industry leaders to raise awareness and support farm recruitment. This includes extension educators, dairy inspectors, dairy supply sales, milk cooperatives, milk producers associations, nutritionists, referrals, publications, and presentations. An on-line safety audit tool to assess safe animal handling practices and infectious disease exposures was used with five veterinarians and provided farm assessments in a simple, applicable format for producers to implement. Further, we partnered with Community Health Services Inc. (CHSI) to provide health services, safety, and health information to dairy workers, farmers, and their families in SE Minnesota through a mobile clinic on dairy farms. With the COVID-19 pandemic, these planned visits were discontinued.

We collaborated with Industrial Hygiene faculty and graduate students at the University of Minnesota School of Public Health to develop an external safety audit tool to assess safety and health hazards on dairy farms, including animal handling, ventilation, equipment operation, repetitive motion injuries, and more. The tool is ready to be used once permitted to do on-site farm visits, and the information will be communicated to the producer and/or manager to make improvements.

In collaboration with Industrial Hygiene faculty and University of Minnesota School of Public Health graduate students, this project developed an external safety audit tool to assess safety and health hazards on dairy farms, including animal handling, ventilation, equipment operation, repetitive motion injuries, and more.

Further, we reviewed and updated the promoting worker health training and educational materials to Minnesota dairies, and uploaded the materials to the Migrant Clinicians Network website. With the help of an instructional designer, we developed online animal handling training materials for producers, also available in printed format, which include learning objectives, teaching activities, and post-training assessment options.

Responding to producers' and workers' concerns about repetitive motion injuries, we worked with High Plains Intermountain Center for Agricultural Health and Safety (HICAHS) to develop a user-friendly fact sheet on muscle and body injuries. In response to producer concerns about COVID , we developed a bi-lingual PowerPoint presentation on precautions dairy producers can implement. In addition, we conducted a survey with UMN Medical School Colleagues of thirty-seven dairy producers in Minnesota and Wisconsin to investigate implementation of biosecurity principles and the impact of COVID-19 on the dairy industry. This survey has been submitted for publication.

Adapting to COVID-19

In response to the COVID-19 pandemic', we gathered input from producers regarding COVID-19 and developed a phone survey and responded to their concerns with COVID-19 resources and materials in Spanish and English. We also worked with National (i.e. CDC, OSHA, FDA, and USDA) and State partners in translating guidance documents for regional dairy producers. This included providing timely webinars to guide the agricultural community.

The project's health and safety trainings are postponed until permission is granted by owners, the University, and the State. Health services offered through a mobile clinic by CHSI were suspended, and testing of the External Safety Audit tool was postponed. At this time, a "Return to Work Plan" was submitted to the University of Minnesota to resume trainings in dairies.

Looking forward

Our focus for the upcoming year is to continue dairy farm recruitment, resume health and safety training for dairy workers, implement Community Health Worker Program in dairies, and test and implement the external safety audit tool. Finally, we continue to adjust project activities to be responsive to COVID-19 challenges in the workforce through periodic surveys of stakeholders to barriers and concerns to worker safety. This includes broad engagement with our Ag Center partners to be responsive to emerging needs.

Assessing and Preventing Work Related Injuries in Animal Agriculture

Background

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.

Project update

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.

Data from companies and worker compensation insurance carriers that characterize injuries can provide insights into the overall burden of injuries, the major types of injuries, and potential opportunities for intervention. These data have some limitations and are often difficult to combine, but offer a more comprehensive picture of injury risks to workers and burden to employers. With these data, we have identified several areas of focus in swine operations, including animal interactions including needlestick injuries, knee injuries, animal interaction injuries, and injuries related to power-washing in swine operations. We are in the process of acquiring similar data related to dairy producers, but the pace of data acquisition has been slowed due to the coronavirus pandemic as the producers have limited time to pursue these activities.

Data collected from the companies and worker compensation carriers provide insights into the risks of injury of larger producer operations which are characterized by more intensive production methods and an employed workforce. While many of the same risks are shared by smaller producers, it is not clear if the impacts are similar. Following input from UMASH advisory board members, we are exploring methods to ascertain primary injury concerns among smaller producers where the majority of the work will be done by the owner/operator and family with only a few hired employees. Data from these operations are more difficult to obtain as they are not routinely collected. We identified several venues in the region where the smaller producers would gather to collect some summary data on injury burden and prevention measures, however, all of these events were canceled due to the coronavirus pandemic.

Following input from UMASH advisory board members, this project is working to understand the injury concerns among smaller producers where the majority of the work will be done by the owner/operator and family with only a few hired employees.

Looking forward

We will continue to explore mechanisms to solicit data from smaller operations in the coming year.

Section III: Other Program & Activity Highlights

Emerging Issues Program

The challenges faced by the agricultural workforce are dynamic. The goal of the UMASH Emerging Issues Program enables UMASH to be nimble enough 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. To support these activities, the UMASH advisory board is key in identifying emerging issues across the region and providing suggestions to address the topic(s).

Manure Hazards

Animal agriculture is significant in the Upper Midwest: dairy, cattle, poultry, and swine are ubiquitous to the landscape, creating a need for moving manure. The potential hazards from manure have been known for decades. UMASH is cooperating with UMN Extension to take a closer look at the emerging occupational hazards in the industry.

Manure Management. UMASH and UMN Extension surveyed 162 Custom Animal Waste Technicians at the 2020 (January - March) training workshops throughout the state to determine the practices of the technicians, and better understand the inherent hazards involved with the occupation. A summary and manuscript have been developed with the intention of publication. Additional safety and health resources are being considered to include as a component of the spring and fall workshops with Extension.

Manure Solids. Recycled manure solids (RMS) have gained popularity on Midwest dairies for their perceived cost savings and availability but the understanding of impacts on herd health was not well known. Dairy faculty in the College of Veterinary Medicine are researching the use of RMS for bedding in Midwest dairy herds over the past 10 to 15 years, evaluating the use of RMS on udder health, air quality, antimicrobial resistance in solids, human health, and economics. Several studies have reported increased bedding bacteria counts and increased mastitis risk in herds using RMS as compared to non-manure materials. Further analysis is needed to investigate if udder health or production differences are linked/related to the bedding used.

Stress and Mental Health

Over the last two years, UMASH has leveraged the Emerging Issues program to partner with organizations to address the issues of stress and mental health in agriculture.

Cultivating Resiliency for Women in Agriculture has continued hosting regular Cultivating Resiliency webinars and coffee chats with external sponsorships and continued UMASH partnership. This year, this partnership hosted a webinar session as a part of the 2020 UMASH Online Expo and continued data analysis on their survey to understand stressors for women in agriculture. This partnership has

grown since its first year with UMASH funding: over 30 webinars and coffee chats have engaged communities across the United States and beyond.

Ag Health and Safety Alliance has continued delivering Gear Up for Ag Health and Safety programming. The partnership has facilitated including stress and mental health in the program via pre and post surveys, a designated segment in the program, and the Mental Health in Agriculture motion graphic. This motion graphic was updated to include inclusive language and updated music. The lifetime reach for this program and tools has been extensive: the motion graphic has had 1,300 views on YouTube, and over 3,000 students in the United States, Canada, Australia, and more.

NAMI Minnesota hosted 22 Question, Persuade, Refer (QPR) sessions, which focus on recognizing signs of suicide and learning the best practices in suicide prevention. Many of these sessions were designed for and hosted by the agricultural community and were either in person or online. Sessions were designed to be delivered in-person but pivoted to online sessions upon the COVID-19 pandemic. Over 550 participants were trained in this past year alone, with a lifetime total of over 30 suicide prevention trainings reaching over 800 people.

Cultivating Resilience in Rural Communities Toolkit was created to support and facilitate conversations about stress and mental health in rural communities. These tools and resources were designed to supplement the Mental Health in Agriculture motion graphic developed in partnership with Ag Health and Safety Alliance, with expert insight from a rural mental health practitioner.

Public Health Institute at the University of Minnesota School of Public Health offers courses for students and practicing professionals in public health and related fields. Three UMASH staff and faculty taught a Public Health Institute course on Providing Mental Health Support to Rural Communities and leveraged the boots-on-the-ground expertise from UMASH partner projects. A number of these partners joined as guest lectures and shared their insight as the class developed their own community intervention plans.

Antimicrobial Resistance (AMR)

This year, two partner projects were funded following the 2019 Annual Forum: *Antimicrobial Resistance: Is it a worker health issue?*:

North Dakota State University faculty and students have been funded to understand if large-animal veterinarians are at an increased risk of antimicrobial-resistant bacterial carriage. This project will evaluate the transfer rate of methicillin-resistant staphylococcus (MRSA) and other AMR bacterial infections in large-animal veterinarians as compared to a community population via the collection of nasal and fecal samples. This project has had to alter in-person recruitment and sample collections due to the COVID-19 pandemic.

Ag Health and Safety Alliance has been funded to review existing AMR resources and develop new content for agriculture and veterinary courses, evaluate the effectiveness of the AMR curriculum, and analyze survey data to understand the safety behaviors of young adults and the risk of AMR

infections and prevention methods. This project has had to shift to delivering information online and accommodate safety protocols for in-person education during the COVID-19 Pandemic.

Aging on the Farm

As the average age of the farmer in the United States approaches 60, and as many continue to live and work on the farm, support and resources are needed. UMASH hosted two *Aging on the Farm* community forums with a focus in Minnesota, the Dakotas and Wisconsin, to engage with the community on this topic. The forums, which were originally planned to occur on farms, were held online with farmers, healthcare professionals, and academic experts. Attendees joined breakout sessions to discuss challenges, opportunities, and share resources. To further this work and expand these partnerships, UMASH will be funding a number of partner projects in the upcoming year.

This focus on supporting aging workers also became the theme for this year's **National Occupational Research Agenda (NORA)** hosted by UMASH and the Midwest Center for Occupational Health and Safety Education and Research Center (MCOHS) held on April 30, 2020, Dr. James Grosch (Co-Director of NIOSH's Center for Productive Aging and Work) presented Productive Aging and Work: Creating an age-friendly workplace. Nearly 150 participants attended from various states and disciplines including academia, health care, government agencies, businesses (insurance, human resources), and nonprofits. The online setting offered a greater reach and diversity of participants from across the country.

Outreach and Engagement

Background

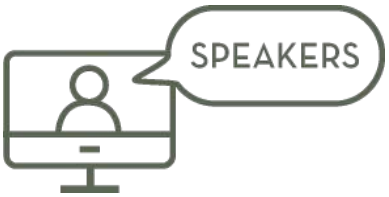
The UMASH outreach team is composed of staff at the University of Minnesota (UMN), the National Farm Medicine Center (NFMC) in Marshfield, WI, and the Minnesota Department of Health (MDH). Our collective purpose is to promote agricultural safety and health in our five-state area, particularly with farmers, farmworkers, and their families. We accomplish our goals by working closely with the other ten National Institute for Occupational Safety and Health (NIOSH) funded U.S. Agricultural Health and Safety Centers, agriculture partners, researchers, educators, and agricultural organizations via farm shows, meetings, conferences, and other stakeholder events. Many of these events are described in our In the Field posts and Spotlight Stories featured on our website.

Outreach Update

UMASH regularly connects with our stakeholders and audiences through online and in-person outreach activities, sharing new resources, research findings, and more. This past year, over 80 email communications reached the UMASH subscribers, with an engaging rebranding of the newsletter taking place in Summer 2020. We've published over 40 Spotlight Stories and over 30 In the Field posts, and many of the email communications highlight these stories and posts about UMASH activities. UMASH engages traditional media outlets to amplify safety reminders and awareness campaigns, promote upcoming events, workshops, webinars, etc. Paid advertisements in print and on-line trade and commodity publications are also used to reach farmers/producers who may rely on those as a primary source of information for their farm operations. This year, UMASH staff expanded safety and health messaging through an increased presence on podcasts, radio shows, and other various interviews.

UMASH Expo: A 20/20 Look at Ag Health, Safety and Wellness

As we started responding to the COVID-19 pandemic, UMASH began to approach outreach and engagement activities through new routes. UMASH outreach staff previously spent much of their time connecting with the audience in person but pivoted to move these activities online. In place of farm shows, UMASH hosted a virtual farm show: the UMASH Online Expo. The three-day, online event was planned to keep the agricultural community informed, connected, and safe with over 40 virtual exhibit booths, over 30 live safety talks, and three live demonstrations.



Each day began with a keynote, with Minnesota Department of Agriculture's Commissioner Thom Petersen, University of Minnesota Extension's Emily Krekelberg, and UMASH Director Jeff Bender addressing health and safety from their perspectives.

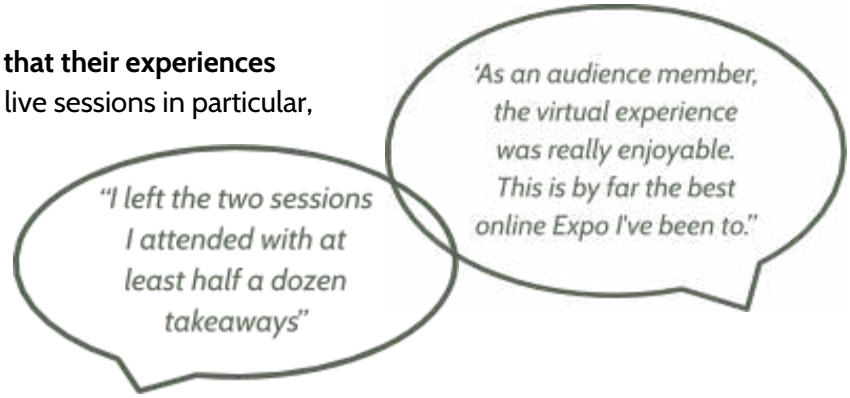
These keynotes were followed by live safety talks from Extension, University of Minnesota faculty, physicians, agricultural health and safety experts, and more. Each day also featured a live demonstration hour, with grain bin safety, power take-off (PTO) and tractor safety, farmer testimonials, and ATV/UTV safety for all ages.

With the help of our partners, the UMASH Expo provided an effective venue for building connections and conducting outreach about agricultural health and safety across the region.

Across all health and safety talks and safety demonstrations during the Expo, an estimated **20 people attended each live session**. Feedback survey respondents reported attending more than **five live talks each** on average throughout the event. All sessions were recorded. These videos have had over **270 views** on the UMASH website. UMASH Expo web pages, including the exhibitor booths, have had more than **3,200 pageviews** by an estimated **1,500 users**.

Farm to Fork, a nationally syndicated radio program dedicated to the agriculture and food sectors, used the safety talks to create 20 one-minute clips in addition to Farm to Fork Features. It is estimated that there were over **one million impressions** when these played during National Farm Safety and Health week, and continue to be aired.

Overwhelmingly, Expo attendees said that their experiences were excellent. Attendees enjoyed the live sessions in particular, noting an appreciation for the brevity and variety of the talks. They also valued the recordings as resources for later viewing and the opportunity to connect with new organizations through the exhibitor booths.



Stress and Mental Health

Ongoing challenges with the farm economy, weather, the COVID-19 pandemic, and more continued into 2020. UMASH has been addressing the stress and mental health concerns during the past year by developing new materials and updating current resources.

Products of our work include a Cultivating Resilience in Rural Communities toolkit to assist rural communities. This toolkit is a guide to support conversations on stress and mental health in the agricultural community. The toolkit includes a discussion guide, participant worksheet, video, and other materials that discussion leaders can use to plan, prepare, and host a group conversation on mental health in agriculture in a community setting. To accommodate distance and virtual discussions, the toolkit was adapted to include language and resources for communities championing mental health conversations during the COVID-19 pandemic.


CULTIVATING RESILIENCE IN RURAL COMMUNITIES

MENTAL HEALTH

- Research shows that **one in five** people struggle with mental health at some point in their lives, but about two in three will never seek treatment.
- Depression is a **leading cause of disability** worldwide and is a major contributor to the overall global burden of disease.
- Some of the **common diagnoses** in mental health are: depression with or without suicidal thinking, anxiety, bipolar disorder, substance abuse (alcohol, opioids, marijuana, and other drugs), schizophrenia.

STRESS

- Chronic stress is associated with both **anxiety and depression**.
- Stress can negatively affect **physical health**.
- People working in **agriculture** can express stress for many reasons:
  - Finances, isolation, regulations and tariffs, weather conditions, farm transition, misunderstanding by the general public.

NOTES:

LEARN MORE AT: umash.umn.edu/cultivating-resilience-in-rural-communities

UMASH's leading stress and mental health resource, Signs and Symptoms of Stress has been used extensively with partner organizations to elevate awareness around chronic stress and what can be done. This year it was co-branded with new partners around the United States and Africa. New co-branding partners included: Wyoming Extension, Wyoming Roundup, WREN magazine, Georgia Rural Health Innovation Center, Nebraska Extension, South Dakota State University

Extension, New York Center for Agricultural Medicine and Health, and Africa AgrAbility.

A new partnership brought stress and mental health resources to more communities. By partnering with Wyoming Department of Agriculture and University of Wyoming Extension, UMASH's Signs & Symptoms of Stress resources were co-branded, but also reimagined to reach farmers and ranchers in Wyoming. A graphic was designed to support conversations with someone who may be struggling. This was featured in media across the state: newspapers, newsletters, magazines and local news. Combined with the print Signs and Symptoms of Stress fliers, these activities reached over 500,000 farmers, ranchers, and professionals working in agriculture.

Telling the Story Project

Telling the Story Project, a collaboration with UMASH, the Great Plains Center for Agricultural Health (GPCAH), and the Central States Center for Agricultural Safety and Health (CS-CASH), turns farmers' first-hand stories about close calls and fatalities into teachable moments. The project website hosts multi-media stories and prevention resources aimed at farmers, agricultural workers, communicators, educators, and policymakers.

This year the project has received extensive media attention in print, online, broadcast media both regionally (Nebraska and Iowa public television and Omaha World Herald) and nationally, (Farm Progress and US News & World Report). Two press releases in particular received a broader reach. These included "Remember to take time for safety" and "Farm safety, mental wellness hit close to home for Extension Educator," The project was shared at conferences and events, including the Agricultural Safety and Health Council Safety Summit, along with an abstract submission to the Journal of Agromedicine.

The Telling the Story Project discussion guides, based on the stories, have been used by educators, 4-H and FFA leaders, managers, and others looking to start a positive conversation about safety. The project extends beyond the Upper Midwest: North Carolina State University Extension is featuring the project on their website for teachers and FFA advisors.

Agritourism and Zoonoses

Keeping visitors safe on agritourism farms remains a priority, and UMASH supports this through training and outreach. In November of 2019, UMASH staff at the Minnesota Department of Health (MDH) hosted the 12th Fun on the Farm: Agritourism Workshop for people with agritourism

operations (petting zoos, apple orchards, pumpkin patches, corn mazes, etc.) to support them on implementing best practices for safe human-animal interactions. Over 500 individuals have been trained since 2016, either in person (360) or by completing the Safer FACEs online certification program.

A notable outcome of these workshops has been a partnership with North Star Farm Tour (NSFT), a 501c3 educational nonprofit organization dedicated to connecting people with agriculture through safe, fun, educational agritourism. Following their participation in an Agritourism Workshop, NSFT amended their bylaws so that all members now go through the same training. Members can leverage the workshops or Safer FACEs. This partnership between NSFT, MDH, and UMASH resulted in a host of new resources: handwashing posters in 18 languages, a safety talk during the UMASH Online Expo, and a comprehensive, downloadable guide and video on building a handwashing station. This organization has prioritized health and safety for their member farms by creating an entire section to the NSFT website dedicated to these health and safety stories and resources.

In addition, The NSFT leadership team has gone on to present at conferences alongside MDH, including at the Minnesota Organics Conference in 2020 "Agritourism: Keeping your visitors, your animals, and your assets safe and healthy." The leadership at NSFT were invited to join the national RFD TV program, FarmHer, where they shared why handwashing makes their farms safer.

MDH staff carried out additional agritourism and zoonoses prevention activities. At the UMASH Online Expo, UMASH staff at MDH hosted a booth featuring the Infectious Disease Epidemiology, Prevention and Control Division. The booth had resources that help keep visitors and workers safe on the farm, especially those with animals. Also, Dr. Joni Scheftel, MDH State Public Health veterinarian and UMASH staff, presented at the virtual Minnesota Farmfest panel, which was co-hosted by UMASH and the Minnesota Safety Council. Her presentation discussed Minnesota Farmers: Responding to COVID-19 during the panel, 'Staying Safe and Staying in Business.'

NIOSH Ag Centers Evaluators, Coordinators, and Outreach (ECO) Group

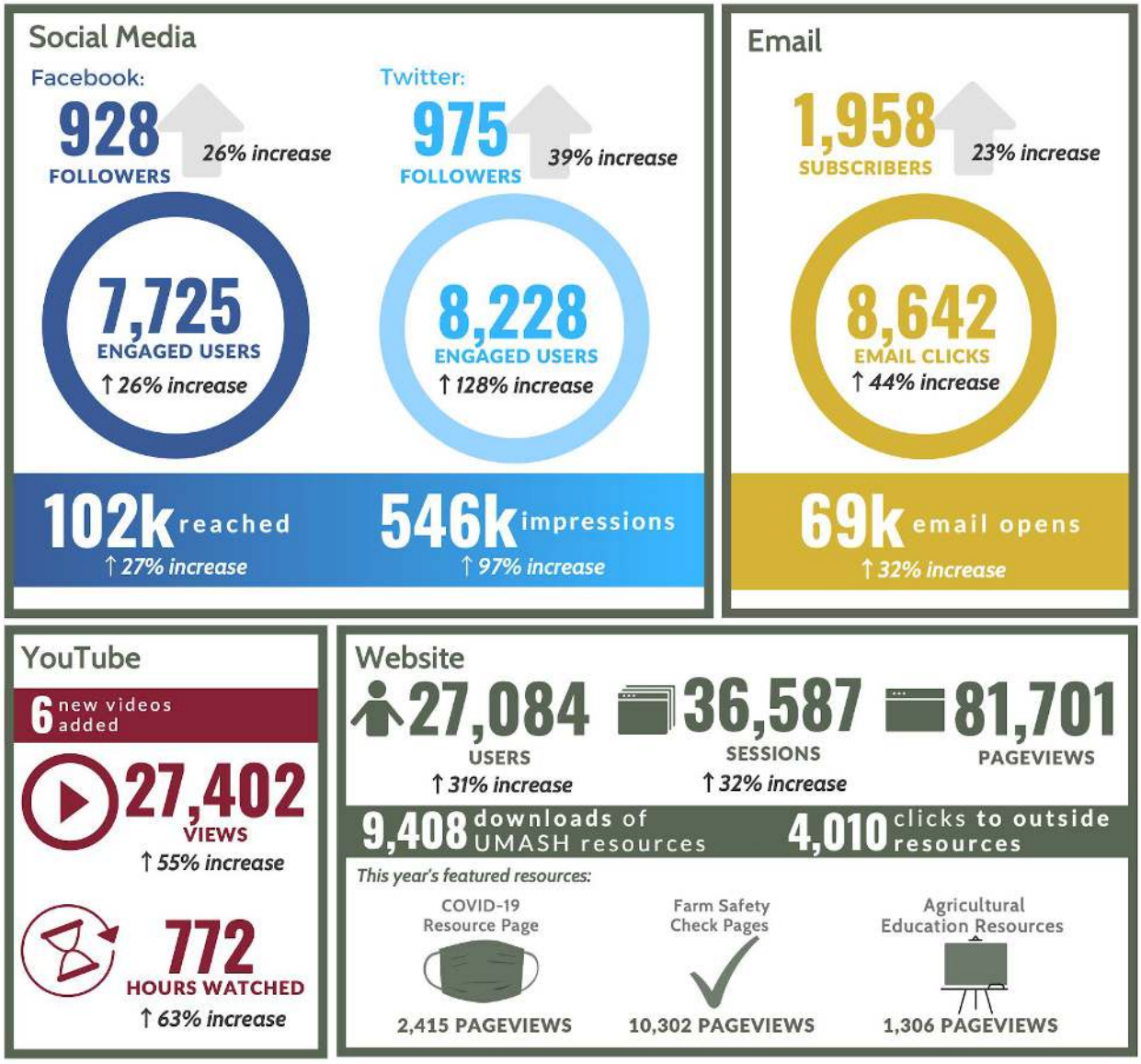
As a part of the larger US Ag Center collective, UMASH participates in regular Evaluator, Coordinator, Outreach (ECO) meetings. UMASH outreach staff is currently leading the planning for the US Ag Center collective participation in two national campaigns: Ag Safety Awareness Program (ASAP) Week (March) and National Farm Safety and Health (NFSHW) Week (September). UMASH created and disseminated the national social media toolkit for the 2020 National Farm Safety and Health Week campaign. The toolkit equipped partners, including NIOSH and all US Ag Centers, with social media content, photo resources, social media guides, and an evaluation worksheet that will inform the impact of the campaign.

Digital Presence and Engagement

UMASH continues to leverage new technology and digital platforms to grow our reach and engagement with agricultural health workers and those that serve them. Digital outreach platforms include:

- UMASH website
- UMASH YouTube
- US Ag Centers YouTube
- UMASH Facebook
- UMASH Twitter
- UMASH Instagram
- UMASH LinkedIn
- Weekly emails
- UMASH Connector (quarterly newsletter

This year, as shown in the graphic below, our effort to share timely and relevant content with stakeholders resulted in increases in traffic on social media platforms, YouTube, and the UMASH website compared to last year.



Featured Outreach Resources

UMASH continues to generate resources to promote health and safety in agricultural settings.

Producer Guides - Positive Animal Handling for Dairy and Swine

We heard from stakeholders that there is a need for training, particularly in animal handling. New animal handling guides and quizzes were developed as training resources for farmers, ranchers, and others to use for training farm employees on positive animal handling for dairy and swine operations. These resources (in English and Spanish) are used with the existing videos to provide training and a check for understanding. Fifty-three online quizzes have been recorded thus far and we intend to promote the guides in the next year for greater reach and use.

Bi-Lingual Handwashing poster

UMASH developed resources focused on preventing infection through hand hygiene, particularly for agritourism vendors and farms with animals.

These posters were recently updated to incorporate new COVID-19 guidelines to address CDC recommendations for farm operations - physical distancing, disinfecting and sanitizing, staggering shifts, and more. They are available in English and Spanish.

Cultivating Resilience in Rural Communities toolkit

Starting conversations about stress and mental health in rural communities can be facilitated with new UMASH resources. This new toolkit was created to support conversations on stress and mental health, either in person or virtually. The toolkit provides the materials needed to convene a community meeting including a discussion guide, participant worksheet, video, and other materials.

"Opal" the Safety Mascot

Connecting and having an impact on our audience and stakeholders online has been advanced through creative and innovative messaging and graphic design. Opal is a dairy cow - designed by one of our graphic designers to promote agricultural safety and health via social media. We have used Opal in key messages for agricultural education, correct use of respirators, guidelines for COVID-19 on farms, and sun safety.

Farm Safety Check

One of UMASH's leading resources is the Farm Safety Check. To ensure the checklists are relevant and impactful, we routinely add new topics, update and audit resources, and have external experts review the content. We have updated 11 of our Farm Safety Checks (FSC) to reflect COVID-19 guidelines.

Stop Think Act

Connecting with other agriculture safety professionals provides an opportunity to share new and existing resources that convey safety and health. One such resource is **Stop Think Act** - a simple yet powerful message. UMASH collaborated with our Canadian colleagues at the Workplace Safety & Prevention Services (WSPS) and Imperial Oil, to expand the Stop Think Act resources to our region.

Current resources include a Farm Safety Check and a poster that can be used in highly visible areas such as break rooms and entryways. Additional resources are being planned to reinforce this message at various locations on the farm (window clings, magnets, and stickers).

Adapting to COVID-19

The outreach team has traditionally had an in-person focus at farm shows, conferences, and meetings. The COVID-19 pandemic led to a significant pivot to online, virtual, and distance-based work in the outreach activities, along with a focus on resource development related to infection prevention and community support. The pandemic inspired a shift of the major farm shows to a virtual event, along with other stakeholder engagement. Relationship building across the region has also been facilitated by the online, virtual focus, particularly in the Dakotas, Wisconsin, and Iowa. We've shifted to creating and adapting resources, including COVID-19 Infection Prevention on the Farm, bi-lingual handwashing posters, a COVID-19 respirator Q&A, and updates to over 10 of the existing Farm Safety Check resources. The COVID-19 resources page includes a robust collection of resources for the five-state region in the Upper Midwest, National resources, and Spanish resources.

The COVID-19 pandemic has provided opportunities as well as challenges for MDH-UMASH outreach projects. It has provided the chance to connect with and learn more about the meatpacking, dairy, and food processing industries in Minnesota as well as strengthen ties with animal agriculture operations and veterinary facilities. MDH staff created specific COVID-19 guidance documents for them and assisted the management of these facilities as they responded to COVID-19 clusters in employees, preventing further illness and building lasting relationships. While the pandemic has delayed or halted much of MDH's previously planned UMASH outreach projects, UMASH staff at MDH will be holding the 5th annual Emerging Issues Gathering on December 5, 2020. This will be a virtual meeting in which some 30 plus agencies and entities that work at the human health/animal health interface will update everyone on their activities and challenges during the past year, including how others have coped with the pandemic.

Looking forward

UMASH has a diverse collection of agriculture education teacher resources, including lesson plans, awareness events, and resources. In the coming year, outreach staff plan to strategize on how we can collaborate on strategies, resources, and methods to leverage existing resources to incorporate more agricultural safety and health education in the classroom, through routes like FFA and 4H. There are plans in place to work towards strengthening relationships with educators, faculty, students, and support staff in ag education. These resources were developed with the intent of being incorporated into existing resources, lesson plans, and curriculums, and delivering health and safety information to youth in agriculture from trusted influencers.

UMASH represents a five-state region: Iowa, Minnesota, North Dakota, South Dakota, and Wisconsin. Outreach staff plan to continue efforts that connect UMASH staff with key stakeholders throughout the region. Partnership building with key organizations and contacts in the Dakotas and Iowa had amplified the presence of UMASH resources this past year. To support the UMASH Community Forums: Aging on the Farm, UMASH partnered with Extension, researchers, and farmers from across the region. We will continue this partnership building to further expand UMASH resources. Minnesota hosts a Minnesota Farm Safety Working Group, consisting of trade associations, the Minnesota Department of Agriculture, Minnesota Department of Health, UMASH, and more. A focus for the upcoming year is to replicate this community by facilitating a Farm Safety Working Group in expanded regions.

In the current grant, UMASH is prioritizing efforts that address the health and safety needs of women in agriculture and immigrant farmworkers, which we have done this past year and continue to work towards. We're moving forward with translating and adapting resources to be culturally relevant. In the next year, outreach staff plans to work towards understanding the needs of our population to better address their unique needs. This includes looking at existing resources and future plans with equity, diversity, and inclusion top of mind. In the coming year, we hope to identify ways to expand

these efforts through activities such as a needs assessment to identify gaps/needs and establish priorities, engaging with more organizations that serve diverse agricultural populations to explore potential partnerships, etc.

We have created a Stop Think Act Farm Safety Check, poster, and Spotlight Story to encourage farmers and farmworkers to take time to slow down, think about the task, and then act when it is safe to do so. Plans are to grow this resource for products and resources such as stickers, posters, magnets, and static clings which can be placed in visible locations.

Videos can be an excellent teaching tool for safety and health. UMASH is planning to expand our resources to include safety and health recommendations for additional livestock producers in the region. Videos can be combined with other teaching tools such as quizzes and guides to enhance the training experience. All of the UMASH videos are available on our YouTube channel.

Zoonotic diseases have received much attention with the onset of COVID-19. It is important to note that zoonotic diseases and their transmission are a concern in animal agriculture overall. Colleagues at the Minnesota Department of Health have recently published a study on zoonotic disease transmission on farms. UMASH plans to use this information in a short video to increase awareness and offer strategies to avoid contamination between people and animals and animals and people.

Occupational health and safety research is a priority for UMASH. UMASH plans to "translate" this research in terms that can be applied by farmers and farmworkers. We plan to do this in the form of "video abstracts" which will bring the research to practice in a user-friendly format.

Telling the Story will continue adding video interviews, prevention resources, contact and feedback information to the site, as well as discussion guides for teachers and press kits for ag communicators, the media, ag educators, and employers. A story is in the works for a truck-farm tractor highway collision that will feature audio from the 911 call.

Evaluation

Background

UMASH Center leadership places a priority on evaluation and strategic planning activities that promote thoughtful decision-making, targeted use of resources, and continuous improvement. The evaluation team utilizes a systems approach to assess Center activities.

Evaluation update

For the majority of this year, Dr. Amy Pekol led the evaluation team, providing guidance and expertise, particularly from an organizational development perspective. As Dr. Pekol has transitioned to a new position, UMASH leadership hired Dr. John LaVelle in September 2020 to be the new UMASH evaluation lead. Dr. LaVelle will provide important expertise in evaluation theory and practice, as well as valuable mentorship for student workers. This year, the evaluation team participated in cross-center evaluation opportunities, supported outreach activities and emerging issues projects, and facilitated organizational development.

Cross-Center Evaluation

Throughout the year, UMASH participated in NIOSH's contribution analysis process, collaborating with other U.S. Agricultural Safety and Health Centers to build a logic model to understand the potential cumulative impact of our work to improve the health and safety outcomes of livestock workers.

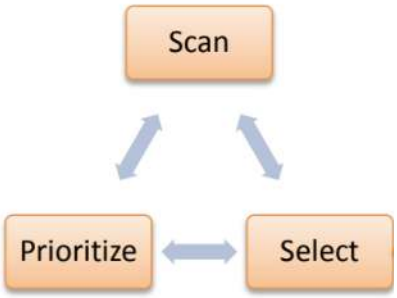
Outreach Core Support

The evaluation team continues to provide monitoring and evaluation support for UMASH outreach activities, including events and online engagement. Our evaluation graduate student has developed a protocol for providing quarterly reports about reach and engagement on UMASH's social media, website, YouTube channel, and email communications. This student meets weekly with the communications team to support social media strategy. This model was particularly helpful to provide data-driven insights during the beginning of the COVID-19 pandemic, as the outreach team transitioned to virtual delivery.

We have also been working to assist the Research and Outreach cores by refining models for translating research findings into practical resources and developing more systematic methods for measuring the impact of these activities. For example, the evaluation team is preparing to refine the UMASH Outreach Reporting Tool that is used to gather and report outreach information to inform planning, reporting, and decision-making.

Emerging Issues Program Support

The evaluation team assists with the Emerging Issues program in several ways. We use a 3-Step Model (Scan-Prioritize-Select) to choose emerging issues to pursue annually. This year, the team began to build a framework for holistically evaluating the Emerging Issues program to better understand associated outcomes.



We also provided evaluation support for UMASH's annual forums, including this year's community forums on Aging Farmers. For this emerging issue, we utilized a WikiSurvey to broadly prioritize health and safety concerns about aging farmers.

Organizational Development

We have prepared to update the UMASH strategic plan by determining strategic themes across the Center's work and conducting a SOAR analysis (strengths, opportunities, aspirations, results) with Center personnel.

Looking forward

In the coming year, the evaluation team will continue to provide support for collaborating, learning, and adaptation throughout the Center. We will focus on updating the strategic plan and preparing for the future by assessing the aspirations and needs of Center personnel and stakeholders. We will also incorporate diversity, equity, and inclusion efforts throughout the planning process. Finally, we aim to establish a scheme of common indicators through which to consistently evaluate the success of the Center.

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 quarterly to discuss current issues and opportunities for collaboration. In 2020, this led to a newly funded safety initiative: the grain storage facility cost share. UMASH supported this initiative through expert testimony at the 2020 Minnesota State Legislative Session and continued to partner with the Minnesota Department of Agriculture in their implementation of this program.

U.S. 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.

Collaboration with fellow US Ag Centers has enabled UMASH to better support farmers, farmworkers, and their families, by leaning on the resources and expertise of each Center. This year, four US Ag Centers participated in the UMASH Online Expo by hosting live, engaging safety talks and exhibit booths. Building off of these activities, UMASH, CS-CASH, HICAHS, National Children's Center for Rural and Agricultural Health and Safety (NCCRAHS), and others joined agriculture educators in New Jersey. Educators are influential to school-aged children, and this group discussed how to incorporate health and safety into the classroom, in person or online.

UMASH continues to actively participate in the US Ag Centers Awareness and YouTube workgroups 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 138 education and training videos (27 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.