



The Upper Midwest Agricultural Safety and Health (UMASH) Center

Summary Annual Report

2022-2023

NIOSH Center for Agricultural Safety and Health
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Section I: Center Overview

Introduction

For the last 12 years, UMASH has worked to support producers, agricultural workers, and farm families through research, community engagement, and outreach. This annual report reflects on the first year of a new funding cycle. Innovative research projects have made progress on their project goals. Projects are varied such as examining farmer mental health, training rural firefighters, and assessing the swine worker microbiome. Our teams have been busy [building networks, providing manure safety training, developing resources, hosting events, and much more](#) to bring safety and health to those who need it. Our teams have **presented over 30 times to a diverse audience of over 2,000 farmers, producers, researchers, community-based organizations, and animal and human health practitioners**. We also had the excellent opportunity to come together for our [first in-person Center meeting](#) since the beginning of the COVID-19 pandemic - we've included photos from this gathering throughout the report. Thank you to all who support and partner with us to work toward our vision: *Healthy and safe people in all agricultural communities.*

About the Center

UMASH is a Center for Agricultural Safety and Health 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**. UMASH emphasizes the concept of One Health, which engages multiple disciplines and sectors to understand the interdependence between animal, human, and environmental health. UMASH is also grounded in the ever-changing nature of agriculture, which influences the health and well-being of agricultural workers. The new 2022-2027 grant cycle includes four funded research projects supporting agricultural worker health and safety:

1. Identifying Individual And Contextual Determinants Underpinning Farmer Help-Seeking Behaviors And Their Role In Shaping Mental Health Outcomes
2. Factors Influencing Transmission Of Airborne Viruses And Bacteria In Animal Agriculture
3. The Influence Of On-Farm Exposures And Biosecurity Practices On The Skin And Nasal Microbiomes Of U.S. Swine Workers
4. Rural Firefighters Delivering Ag Safety And Health (RF-DASH) - Next Steps



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 agricultural safety and health; and an evaluation program to monitor and assess the performance and outcomes of the Center.

UMASH Key Personnel	Role
Jeffrey B Bender, DVM, MS, DACVPM University of Minnesota, School of Public Health Phone: 612-625-6203 Email: bende002@umn.edu	Center Director
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Megan M. Schossow, MS University of Minnesota, School of Public Health Phone: 612-625-8836 Email: schos021@umn.edu	Center Coordinator and Outreach Director
John LaVelle, PhD University of Minnesota, College of Education and Human Development Phone: 612-626-0884 Email: jlavelle@umn.edu	Evaluation Director
Florence Becot, Ph.D., M.Sc. Marshfield Clinic Research Institute, National Farm Medicine Center Phone: (715) 389-9379 Email: becot.florence@marshfieldresearch.org	Project PI: Identifying Individual And Contextual Determinants Underpinning Farmers Help-Seeking Behaviors And Their Role In Shaping Mental Health Outcomes
Peter Raynor, PhD University of Minnesota, School of Public Health Phone: 612-625-7135 Email: praynor@umn.edu	Project PI: Factors Influencing Transmission Of Airborne Viruses And Bacteria In Animal Agriculture
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Section II: UMASH Research Projects

Identifying Individual and Contextual Determinants Underpinning Farmer Help-Seeking Behaviors and Their Role in Shaping Mental Health Outcomes

Background

Farmers and ranchers experience greater mental health challenges - like stress, anxiety, depression, and suicide - compared to those in other occupations. Many farmers, policymakers, and health and safety organizations have expressed a critical need to address this concern, especially as agricultural communities continue to face increasing stressors. Still, we know little about how farmers seek help and how effective and accepted mental health interventions are for this population. This research project will map the contextual determinants of farmers' help-seeking behaviors, describe farmers' help-seeking behaviors, mental health challenges, and the role played by individual and contextual determinants. It will compare and contrast farmers' help-seeking behaviors and assess their effectiveness in reducing mental health burdens across a diversity of farmers in the 12-state study region. Finally, the project aims to adapt the Andersen Behavioral Model of Health Services Use to Midwestern farmers. Overall, this project aims to assess farmers' help-seeking behaviors, the factors that shape these, and factors associated with better mental health outcomes.

This project will be the first in the U.S. to conduct an **in-depth regional assessment of farmers' help-seeking behaviors and their connections to mental health outcomes.**

Project update

To create the contextual determinants of farmers' help-seeking behaviors database, the project team successfully downloaded data for 77 factors. Although the project has a 12-state study region, the most efficient approach to manage the data was to download data for all 50 states. Thus, the team is investigating making the full dataset available as an additional project output. The team conducted an



Florence Becot, Principal Investigator

environmental and resource inventory in three study states (Minnesota, South Dakota, and Wisconsin), finding that since 2019, the number of available farmer mental health resources has quadrupled. The team is currently working on a manuscript describing this inventory and its findings.

Additionally, the team made strides in key informant recruitment and interviews, with 40 interviews completed. They have successfully developed outreach materials, fostered collaboration with the project advisory board and other colleagues, and engaged in professional development and networking efforts.

Factors Influencing Transmission of Airborne Viruses And Bacteria In Animal Agriculture

Background

Animal agriculture workers may be exposed when animals generate virus- and bacteria-containing aerosols. To assess exposures to viral aerosols and manage them effectively, we must know the concentrations and sizes of particles with which infectious airborne viruses are associated. This project will build on [previous UMASH research](#), which designed a novel high-flow Cascade Virtual Impactor (CVI) for measuring airborne virus and bacteria particle concentrations and size distributions. This sampler will be used to measure viruses and bacteria in swine gestation and farrowing, swine wean-to-finish, poultry, and dairy facilities. Researchers will also measure various factors that may determine exposure to viruses and bacteria, such as environmental conditions, animal characteristics, housing factors, and ventilation. By relating these factors to measurements of airborne viruses and bacteria, the researchers aim to develop recommendations for reducing the risk of zoonotic disease transmission between animals and workers in animal agriculture facilities.



Project update

An instrument array has been assembled, which will be used to sample airborne concentrations and surface loadings of pathogens in animal production facilities. The project team will also collect data on factors that may influence pathogen concentrations, like housing, room dimensions, animal density, and more. One instrument, the AirPrep Club, is notably loud, so the team developed a method to use disposable foam to partially insulate the sampler to reduce sound during operation. They are also working to verify the performance of the Bioaerosol Cascade Virtual Impactor (BCVI) developed with previous UMASH funding. The BCVI will be used in field sampling once its performance is acceptable and verified. Further, a literature review is underway to identify ways to assess ventilation parameters in facilities while the ventilation systems are operating.

The team has also begun outreach to swine producers to identify participant sites, with plans to begin field sampling soon. The project team works synergistically with another UMASH research team (The Influence of On-Farm Exposures And Biosecurity Practices on the Skin and Nasal Microbiomes of U.S. Swine Workers).

The Influence of On-Farm Exposures and Biosecurity Practices on the Skin and Nasal Microbiomes of U.S. Swine Workers

Background

The human microbiome plays a vital role in human health and disease, and many factors shape each individual's microbiome. Workplace environments and animal exposures have been shown to

The microbiome is the **community of microorganisms (e.g., fungi, bacteria, and viruses) that exist in an environment, such as on a specific body part or in a workplace.**

influence the microbiomes of workers. For example, people who work with dairy cows and pigs have different oral and nasal microbiomes than non-livestock workers. However, it is unclear how these differences occur and whether they are beneficial, harmful, or neutral in the short- and long-term. This project aims to understand better

how the conditions within swine farms influence the microbiome of swine workers. Researchers will test the hypothesis that different on-farm microbiomes impact worker microbiomes differently based on the worker's assigned job tasks. The findings of this study will support the further development of evidence-based, targeted interventions to protect and improve the health of swine workers.

Project update

This project team has acquired needed DNA extraction kits, and they have been working to finalize data collection instruments such as a questionnaire survey, a participant screening and enrollment sheet, and a task log form. This project team collaborates with another UMASH research team (Factors Influencing Transmission of Airborne Viruses and Bacteria in Animal Agriculture) to coordinate sample collection, create cross-project synergy, and reduce the burden on participating farms. Participant recruitment is planned to begin in early 2024. Both teams are collaborating with the University of Minnesota Extension to support contact with farms and outreach to workers.



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

Background

Previous research by this team established that farm operators have high levels of esteem and trust in rural firefighters and emergency medical personnel (fire/EMS) as advisors regarding injury prevention. This translational research program aims to improve farm access to capable and trusted health and safety consultation to reduce farm hazards and improve farm safety.

Over 60 fire and EMS personnel in 10 states have been trained in the full RF-DASH program, and they have supported approximately 500 individuals, including agricultural health and safety professionals, educators, community members, and farmers.

The research team will build on the success of previous UMASH projects where rural fire/EMS enthusiastically received the Rural Firefighters Delivering Agricultural Safety and Health (RF-DASH) program. This cycle focuses on improved

dissemination and implementation (D&I) strategies for both the core RF-DASH program and its trainees.

Project update

The RF-DASH team kicked off the first year of their continued project with an Agriculture Rescue



Kyle Koshalek, Project Manager

Training in Wisconsin. The trainers already had farmers lined up to begin mapping and collaborating to make their farms safer!

They also finalized the official RF-DASH training manual and are working to publish a hard copy for interested trainers. Further, the team developed interview tools and initiated semi-structured interviews with RF-DASH-trained members and fire/EMS departments. The interview tools will be used to assess the dissemination and implementation of RF-DASH throughout the duration of the grant.

The project team has received an increase in training requests for new departments in new regions. Thus, they have focused on

expanding their capacity and reach nationally and internationally in several ways, including virtual learning, trademarking, and translating materials. For example, the team is developing a virtual 360 RF-DASH training program set for release in 2024. The program will allow trainees to train and retrain themselves, as well as conduct virtual walk-throughs on farms. They are also finalizing Farm MAPPER's latest version, which will equip emergency responders with additional information and features to mitigate risks and better prepare them when en route to an emergency on the farm or ranch. RF-DASH has a vast network of collaborators and continues to share information through quarterly newsletters, attending conferences, and updating the rfdash.org news page.

Section III: Other Program & Activity Highlights

Emerging Issues Program

The UMASH Emerging Issues Program aims 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 network and advisory board are key in identifying emerging issues across the region and providing suggestions to address the topic(s). Read on for highlights of this year's emerging issues, topics, and activities.

Do you have a concern to share?
Share it with us in this short [survey](#).

Aging on the Farm

Many farmers in our region continue to live and work well past retirement age. Aging can bring on new challenges on the farm. The body changes with age, sometimes causing slow reaction times, mobility challenges, eyesight, and hearing loss. These physical changes can make working with farm hazards like pesticides, animals, and heavy machinery more dangerous. In response to this issue, UMASH hosted two [Aging on the Farm](#) community forums and funded [four partner projects that successfully implemented innovative solutions](#) and [generated impactful recommendations](#) - all to support the aging agricultural workforce.

To build upon this work, UMASH is hosting another [virtual forum in October 2023](#). The goal is to gather familiar and new partners across diverse fields and expertise, including farmers, experts on aging, ag health, and safety professionals, occupational therapists, health practitioners, social workers, veterinarians, and more, to continue collaborating on solutions for healthy and safe aging in agriculture.



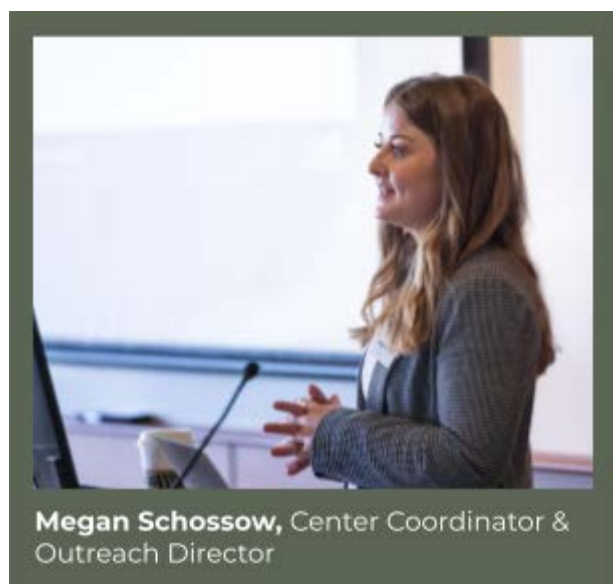
Healthy & Safe Aging on the Farm

VIRTUAL UMASH FORUM

October 12, 2023, 9:30-11:30 am

Manure Hazards

For UMASH, it has been the year of manure! For the last few years, the Center has been working to understand and prevent injuries and fatalities related to manure management. [A recent study](#) by UMASH and colleagues at the University of Minnesota Extension explored the self-reported occupational hazards of manure applicators in Minnesota.



UMASH collaborated to share the results of this study through a [webinar for the Livestock and Poultry Environmental Learning Community \(LPELC\)](#) and in publications in the [Journal of Nutrient Management](#) and [Progressive Dairy](#).

Additionally, UMASH created a new Farm Safety Checklist to help workers prevent safety hazards along the path of manure management, including storage, agitation, pumping, transportation, and application. In collaboration with the University of

Minnesota Extension, the UMASH outreach team shared this resource and the study findings to facilitate worker safety training at six Minnesota Commercial Animal Waste Technician continuing education workshops this year, reaching almost 130 workers.

Occupational implications of livestock and use of manure of produce farms

A UMASH outreach event stirred up conversations and questions, ultimately leading to an emerging issues study focused on farming safely with livestock and produce. In 2021, UMASH, in partnership with a local farm, University of Minnesota Extension, and the Minnesota Department of Agriculture hosted a [field day](#) exploring produce production best practices that support worker, consumer, animal, and environmental health. The resulting study is currently surveying produce farmers to understand manure and compost use. The goal is to develop strategies for reducing potential health, safety, and financial risks to producers and consumers.

Swine Barn without the Smell: An innovative training tool

UMASH has been working in partnership with Ag Health and Safety Alliance to develop an innovative training tool that brings the swine barn to workers, visitors, and interested parties. Leveraging 360 degree cameras and virtual reality technology, several types of swine production facilities (e.g. farrowing, gestational) are captured. This resource will provide an engaging and experiential learning experience to increase health and safety knowledge, including hazard identification.

Outreach and Engagement

Background

The UMASH outreach team is composed of staff at the University of Minnesota (UMN) School of Public Health, 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 (Iowa, Minnesota, North Dakota, South Dakota, and Iowa).

We accomplish our goals by working closely with the other National Institute for Occupational Safety and Health (NIOSH) funded U.S. Agricultural Health and Safety Centers, agriculture partners, researchers, educators, and organizations via farm shows, meetings, conferences, and other stakeholder events. UMASH regularly connects with our stakeholders and audiences through online, email, print, and in-person outreach activities, sharing new resources, research findings, and more. “In the Field” posts and “Spotlight Stories” on the UMASH website describe these.

Spotlight Stories share in-depth information on health and safety topics and often highlight a person, project, or program promoting occupational safety and health in agriculture. **In The Field** posts highlight UMASH activities, especially in-person events and working directly with farmers.

Outreach Update

The UMASH outreach team continues to build and leverage partnerships, translate evidence into new resources, offer expert interviews, and have boots on the ground at various venues to meet the health and safety needs of agricultural workers in our region. UMASH outreach events, including at MN Farmfest, are estimated to have reached **at least 7,000 people this year**. Outreach team members have been interviewed by media **this year on a number of issues including safe spring planting**,

farming and back pain, sun safety, aging, and more. These were diverse audiences of farmers and rural communities through print, radio, podcasts, and television.

UMASH leverages digital venues to grow our reach and engagement with agricultural health workers and those serving them. This year, UMASH reached approximately **30,000 users on Facebook**, **35,000 on Twitter** (now X), and **5,700 on Instagram** (our newest platform!). Our **2,500 email subscribers** regularly engage with the information we share and send positive feedback to our team. The UMASH YouTube channel has received **16,900 views**, **443.2 hours of watch time**, and **over 80 new subscribers** this year.

- [UMASH website](#)
- [UMASH YouTube](#)
- [US Ag Centers YouTube](#)
- [UMASH Facebook](#)
- [UMASH Twitter \(X\)](#)
- [UMASH Instagram](#)
- [UMASH LinkedIn](#)
- [Weekly emails](#)
- [UMASH Connector](#) (quarterly newsletter)

Featured Outreach Resources

Sow Safety. Working with large animals, such as sows, can be a health and safety risk for farmworkers. This year, UMASH collaborated with a multidisciplinary team of experts to [develop a new sow safety video offering practical recommendations to avoid serious injury](#).



Highly Pathogenic Avian Influenza. Outbreaks of highly pathogenic avian influenza (HPAI) continue to occur across the United States and globally. [UMASH has responded to the HPAI outbreak through partnerships and resource development](#) to equip farmers, farmworkers, and students with key information and training. UMASH leveraged internal expertise from UMASH human and animal health practitioners from MDH and CVM.

Wildfire Smoke Safety. Wildfire smoke and air quality have become important concerns in the Upper Midwest and nationwide. [Since agriculture is an outdoor job, UMASH compiled a toolkit](#) with many resources to help farmers know the key terms, hazards, and strategies to keep themselves safe and healthy in these dangerous environmental conditions. The outreach team worked closely with the UMASH advisory board to address this important, ongoing emerging issue.

Sleep Hygiene. There are so many things to get done on the farm, so it can be hard to get healthy sleep. Fatigue and drowsiness can increase the risk for injuries at work. To help farmers, farmworkers, and their families improve sleep quality, [UMASH compiled a toolkit of resources to support sleep hygiene](#), including a [poster](#) and a [social media toolkit](#) to amplify key health messages.



UMASH Wellness Pavilion: Minnesota Farmfest

For the fifth year, the UMASH team set out on the road to Redwood County to provide up-to-date safety and health information to the event's **nearly 30,000 attendees**. The [UMASH Wellness Pavilion](#) offers hands-on activities, blood pressure screenings, and live ag safety demonstrations to encourage learning and conversation about *Living Healthy, Farming Safely*.

This year, **UMASH** was joined by **over 20 other national, regional, and local organizations** in connecting with attendees on farm and occupational safety, mental health, healthy living, roadway safety, and many other topics. In collaboration with sponsors, exhibit partners, and experts, **UMASH presented six daily ag safety and rescue demonstrations** about ATV/UTV safety, lawn mower safety, Power Takeoff (PTO) safety, grain bin safety, and more. CentraCare also offered free blood pressure screenings in the Wellness Pavilion.



UMASH Behind The Scenes

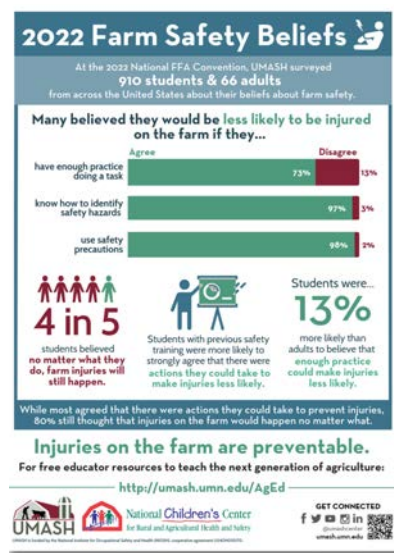
[University of Minnesota School of Public Health \(SPH\) Interim Dean Tim Beebe visited with UMASH for a video series, SPH Behind the Scenes!](#) Dr. Beebe interviewed Center Director Dr. Jeff Bender, former Research Project Specialist Chela Vázquez, and Center Coordinator and Director of Outreach Megan Schossow. In the video, they discussed their work and current agricultural health and safety topics, like the impact of the changing climate, workforce, and agricultural industry.



Engaging the Next Generation of Agriculture

The UMASH outreach team partnered with Dr. McKay for the third year to hold a [Public Safety Announcement \(PSA\) contest](#) for students in a video production course offered through the College of Food, Agricultural and Natural Resource Sciences (CFANS) at the University of Minnesota. The students did a fantastic job highlighting topics like farm vehicle and ATV safety.

Additionally, UMASH teamed up with the National Children's Center for Rural and Agricultural Health and Safety to [survey FFA-ers at their 2022 National Convention](#), finding that most students agreed they could take action to prevent injuries on the farm. Still, **4 out of 5 believed injuries were bound to happen**. The summary [infographic](#) shares more information.



Climate Impacts on Worker Health and Safety

Each year, UMASH, and the Midwest Center for Occupational Health and Safety (MCOHS), hosts the National Occupational Research Agenda (NORA) Symposium. [This year's theme was "Changing the Climate of Worker Health and Safety: A Forum on Lessons and Actions to Foster a Resilient Workforce."](#) featuring presentations and discussion with a panel of experts on the effects of climate change on worker health and safety. Nearly **100 participants from across the country** joined this online symposium.

Telling the Story Project

[Telling the Story Project](#), a collaboration between 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.

This year, the Telling the Story Project team was at the International Society for Agricultural Safety and Health (ISASH) in Tampa, Florida in June 2023 this year. The team led an engaging workshop called *Taking Telling the Story to the Next Level* - including a "snowball fight brainstorm" (see photo). The workshop's purpose was to encourage others to find, write, and share stories with an injury prevention message.



The project has been featured alongside the UMASH Center in [national media](#), bringing important stories to the agricultural community. UMASH cultivates media relationships year-round, including at the 2023 Ag Media Summit and the 2023 National Association of Farm Broadcasters

National NIOSH Ag Centers Safety and Health Summit

In Marshfield, WI, seven of the US Centers for Agricultural Safety and Health gathered for the Ag Centers Safety and Health Summit, September 19-21, 2023. Faculty and staff from the Centers joined NIOSH's Dr. Jennifer Luncoln and KC Elliott for several days of scientific seminars, networking, and sharing research initiatives and outreach activities.

Evaluation

Background

UMASH prioritizes evaluation and strategic planning activities that promote thoughtful decision-making, targeted use of resources, and continuous improvement. The evaluation team regularly supports outreach activities and emerging issues projects, facilitates organizational development and strategic planning, and participates in collaborative evaluation efforts with partners, including other Ag Centers.



Carrie Henning-Smith, UMASH researcher, chats with Devon Charlier, Evaluation Manager

Evaluation update

This year, the evaluation team piloted a Center-wide monitoring, evaluation, and learning (MEL) system to assess the degree to which UMASH activities are delivered with fidelity and are effective at promoting the health and safety of agricultural workers and their families. This system is continually refined to facilitate effective knowledge management, collaboration, adaptation, and improvement across the Center.

The evaluation team has also been working to better understand the UMASH network and identify strategies for intentionally expanding and deepening our partnerships with those involved in or affected by agricultural health and safety in the Upper Midwest. The first phase of this network mapping project involved a demographic analysis of UMASH's primary stakeholders using USDA data and a landscape analysis of stakeholder organizations. We also utilized our UMASH contact lists and web resources to identify organizations currently not in our network. Future phases of this project include a survey of current collaborations across the UMASH network and facilitating focus groups to identify and prioritize action steps. The goal is to expand our partnerships across the five-state region, commodity groups, and others in agriculture that have been historically and currently marginalized.

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 the MN State Legislature to fund the Minnesota Rollover Protection System (ROPS) Rebate Program. The group continues to meet quarterly to discuss current issues and opportunities for collaboration. This group has been integral to securing recurring Minnesota legislative funding to create a safety equipment cost-share program. This program funds roll bars on machinery, in addition to equipment that makes grain bins and silos safer.

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. UMASH has provided leadership, social media content, and evaluation strategies to support collaborative Ag Center participation in two major national campaigns: Ag Safety Awareness Program ([ASAP](#)) Week (March) and National Farm Safety and Health ([NFSHW](#)) Week (September). We continue to collaborate and partner with other US Ag Centers and participate in the ECO group to plan, implement, and assess collective outreach initiatives, including the [US Ag Center YouTube](#), which has more than **3,430 subscribers** and **176 education and training videos (33 from UMASH)** on a wide range of agricultural safety and health topics (many in Spanish and other languages).



UMASH Colleagues **Pete Raynor, Leah Bauck, Carrie Klumb, Joann Larson, and Debb Grove** at the Spring Center Meeting