Personal Protective Equipment for Influenza A (H5N1) in High-Risk Farm Settings

A Workshop

September 29 and 30, 2025

MEETING MATERIALS

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NATIONAL ACADEMIES Sciences Engineering Medicine

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Personal Protective Equipment for Influenza A (H5N1) in High-Risk Farm Settings

A Workshop

Agenda

Day 1: September 29, 2025 | 10:00 AM – 4:30 PM ET
Day 2: September 30, 2025 | 10:00 AM – 4:00 PM ET

SPONSOR

Sponsored by the National Institute for Occupational Safety and Health's National Personal Protective Technology Laboratory.

OBJECTIVES

This workshop will examine personal protective equipment (PPE) needs and best practices to protect workers in high-risk U.S. farm settings and control Influenza A (H5N1) transmission between livestock and humans. The workshop will feature invited presentations and discussions to:

- Discuss the latest scientific evidence on Influenza A (H5N1) transmission and remaining uncertainties and implications for PPE use in high-risk farm settings, including the role of PPE relative to other kinds of controls (e.g., engineering, administrative).
- Examine U.S. regulatory frameworks and explore needed reforms to improve PPE use for preventing zoonotic disease transmission, with a focus on current guidance, best practices, and gaps in high-risk farm settings.
- Highlight individual-level and systemic barriers to PPE access and use in high-risk farm settings and explore potential solutions to overcome these barriers, including the roles of novel technologies, communication, and education and training.
- Highlight key research needs to evaluate and improve the effectiveness of PPE when used in high-risk farm settings to protect workers and control the spread of zoonotic diseases.
- Consider opportunities to improve future responses to emerging and re-emerging infectious diseases that have the potential to spread between livestock and humans.

DAY 1 – MONDAY, September 29, 2025

Day 1 will explore how H5N1 spreads across species and what this means for PPE use in high-risk farm environments. Sessions will cover transmission risks, PPE regulatory structures, and current biosecurity practices, while highlighting real-world challenges farmworkers face when using PPE. Participants will also examine how risk perception, education, and trust influence PPE adoption, and identify community-level and systemic barriers to PPE access. Emphasis will be placed on the role of trusted organizations and what they need to better support worker protection and pandemic preparedness in the agricultural sector.

Welcome and Overview of the Workshop (45 min)

10:00 a.m. **Chair Welcome and Opening Remarks** (15 min)

Shawn Gibbs, Workshop Chair
Dean, School of Public Health
Dean's Chair and Professor of Environmental and Occupational Health
Texas A&M University

10:15 a.m. **National Institute for Occupational Safety and Health (NIOSH) Opening Remarks** (15 min)

Maryann D'Alessandro
Director
National Personal Protective Technology Laboratory (NPPTL)
National Institute for Occupational Safety and Health (NIOSH)
Centers for Disease Control and Prevention (CDC)

National Center for Immunization and Respiratory Diseases (NCIRD) Opening Remarks (15 min)

Lizette Durand
Chief Veterinary Officer
Influenza Division
National Center for Immunization and Respiratory Diseases (NCIRD)
Centers for Disease Control and Prevention (CDC)

Session 1 Stage Setting: Current State of Knowledge on H5N1 Transmission and Implications for PPE Use (60 min)

10:45 a.m. **Session Introduction** (5 min)

Matthew Nonnenmann, Planning Committee Member
Professor
University of Nebraska Medical Center

- *Examine viral transmission within and across species and infection characteristics (common symptoms and severity) in animals and humans.*
- *Discuss the knowns and unknowns about animal-to-human transmission risks in high-risk farm activities, and examine the implications for PPE use in high-risk farm settings, including the role of PPE relative to other kinds of controls (e.g., engineering, administrative).*

- *Consider current science- and risk-based understanding of airborne disease transmission.*

10:50 a.m. **Panel Presentations** (40 min)

Animal Infection and Transmission
Jason Lombard
Veterinary Epidemiologist
Colorado State University

Environmental Transmission
Seema Lakdawala
Associate Professor
Emory University

Human Infection and Transmission
Rachel Herlihy
State Epidemiologist and Deputy Chief Medical Officer
Colorado Department of Public Health and Environment

11:30 a.m. **Audience Q&A** (15 min)

Session 2 — Stage Setting: Current Practices and Policies for H5N1 Infection Control and Prevention in Farm Settings (60 min)

11:45 a.m. **Session Introduction** (5 min)

Michelle Kromm, Planning Committee Member
Principal
Food Forward, LLC

- *Explore federal, state, and local oversight systems, regulatory variation, and opportunities for industry engagement in infection control.*
- *Review current best practices for PPE and biosecurity plans across agricultural settings, including how guidance is developed within the hierarchy of controls.*

11:50 a.m. **Panel Presentations** (40 min)

Systems or Federal Perspective
John Gibbins
Office of Agriculture Safety and Health (OASH)
National Institute for Occupational Safety and Health (NIOSH)

Public Health Perspectives
Stacy Holzbauer
State Public Health Veterinarian
Career Epidemiology Field Officer
Minnesota Department of Health
Centers for Disease Control and Prevention (CDC)

Poultry Perspectives
Caitlin Green
Poultry Veterinarian
Michigan Turkey Producers

Dairy Perspective
Joe Armstrong
Technical Service Veterinarian
Zoetis

12:30 p.m. **Audience Q&A** (15 min)

12:45 p.m. ***BREAK*** (30 min)

Session 3 **Problem Setting: Individual Barriers to PPE Use for H5N1 Infection Control and Prevention in High-Risk Farm Settings** (90 min)

1:15 p.m. **Session Introduction** (5 min)

Beth Lipton, Planning Committee Member
Washington State Public Health Veterinarian
Washington State Department of Health

- *Hear firsthand perspectives on PPE use challenges in farm settings, including practical limitations, secondary health risks, and decision-making on protective options.*
- *Examine how risk perception influences PPE use, including task-based risk assessments, perceived protection, and individual risk tolerance.*
- *Identify barriers to effective PPE use, including education, training, language, cultural factors, and trust.*

1:20 p.m. **Panel Presentations** (60 min)

Insights from Farm Workers and Producers
Brent Wilson
Wilson Centennial Farm
Member of the Michigan Milk Producers Association

Research-Based Perspectives from the Field and Practical Experiences from Researchers
Anabel Rodriguez
Assistant Professor
Department of Environmental and Occupational Health
Texas A&M University

Bethany Alcauter
Director of Research and Public Health Programs
National Center for Farmworker Health

Training and Education Programs
Anna Meyerhoff
Senior Bilingual Agricultural Safety
Education Coordinator
New York Center for Agricultural Medicine and Health
Northeast Center for Occupational Health and Safety in Agriculture, Forestry, and Fishing

Agricultural Extension Perspectives
Gino Lorenzoni
Associate Professor, Poultry Science and Avian Health
PennState Extension

2:20 p.m. **Audience Q&A** (25 min)

Session 4 **Problem Setting: Systemic Barriers to H5N1 Infection Control and Prevention in High-Risk Farm Settings** (90 min)

2:45 p.m. **Session Introduction** (5 min)

Anabel Rodriguez, Planning Committee Member
Assistant Professor
Department of Environmental and Occupational Health
Texas A&M University

- *Discuss community and societal barriers to PPE access and use.*
- *Identify the needs of trusted organizations to better support worker PPE access and adoption.*

2:50 p.m. **Panel Presentations** (60 min)

Farmworker Advocacy Organizations
Amy Liebman
Chief Program Officer
Migrant Clinicians Network

Producers and Coops
Martín J. Carrasquillo-Mangual
Dairy Extension Educator
Michigan State University Extension

Promotoras and Community Partners
Lus Chávez
Community Health Worker
Texas Panhandle

Ma Elena Gutierrez
Executive Director
Fe Y Justicia

3:50 p.m. **Audience Q&A** (25 min)

Day 1 Wrap-Up (15 min)

4:15 p.m. **Chair's Reflection and Preview of Day 2** (15 min)

Shawn Gibbs, Workshop Chair
Dean, School of Public Health
Dean's Chair and Professor of Environmental and Occupational Health
Texas A&M University

4:30 p.m. **Day 1 Adjourns**

DAY 2 – TUESDAY, SEPTEMBER 30, 2025

Day 2 focuses on forward-looking strategies to enhance PPE effectiveness and adoption through innovation, training, and systems integration. Sessions will highlight successful behavior-change programs, communication strategies, and collaborative efforts to strengthen farm-level preparedness within a broader national health and food security framework.

Welcome and Recap of Day 1 (15 min)

10:00 a.m. **Chair Welcome and Opening Remarks** (15 min)

Shawn Gibbs, Workshop Chair
Dean, School of Public Health
Dean's Chair and Professor of Environmental and Occupational Health
Texas A&M University

Session 5 **Opportunities: Improving Existing PPE Access and Feasibility of Use** (60 min)

10:15 a.m. **Session Introduction** (5 min)

Ximena Vergara, Planning Committee Member
Chief, Hazard Evaluation System and Information Service
California Department of Public Health
Adjunct Assistant Professor of Epidemiology
University of California, Los Angeles – Fielding School of Public Health

- *Identify administrative and engineering controls to improve PPE feasibility, reduce transmission, and lower costs.*
- *Explore the potential alternatives to NIOSH-approved respirators in high-risk farm settings and implications for respiratory protection program.*
- *Identify barriers in the PPE supply chain and assess solutions to improve access, availability, and distribution of respiratory protection where it is most needed.*

- *Highlight key research needs to evaluate and improve the effectiveness of PPE to protect workers.*

10:20 a.m. **Panel Presentations** (40 min)

Worker Health – Project PROTECT
Elon Ullman
Research Scientist – Industrial Hygienist
California Department of Public Health – Project PROTECT

Engaging Partners in PPE Distribution
Heather Riden
Manager
Western Center for Agricultural Health and Safety at UC Davis

Research Priorities
Jin Pan
Assistant Professor
Occupational and Environmental Health
University of Iowa

11:00 a.m. **Audience Q&A** (15 min)

Session 6 **Opportunities: Innovative PPE Technology and Research** (90 min)

11:15 a.m. **Session Introduction** (5 min)

Herek Clack, Planning Committee Member
Associate Professor
Department of Civil and Environmental Engineering
University of Michigan, Ann Arbor
Co-founder, Co-Chief Executive Officer, and Chief Scientific Officer for Taza Aya

- *Highlight technologies and products, as well as key research needs, to improve the effective implementation of PPE for use in high-risk farm settings to protect workers from and control the spread of H5N1.*
- *Highlight advanced and emerging technologies with the potential to strengthen the hierarchy of controls, with a focus on PPE.*
- *Explore strategies to drive sustainable innovation in PPE and engineering controls, including certifications for consumer trust.*

11:20 a.m. **Panel Presentations** (60 min)

Research Priorities and Gaps
James Coburn
Senior Advisor for Emerging Technologies; U.S. Food and Drug Administration (FDA)
On detail as Portfolio Lead to ARPA-H

Lessons Learned from Innovative Respirators
Richard Gordon
CEO
Airgami Respirators
Air99 LLC

Wearable Air Curtains: Novel Respiratory Protection Against Airborne Pathogens
Herek Clack, Planning Committee Member
Associate Professor
Department of Civil and Environmental Engineering
University of Michigan, Ann Arbor
Co-founder, Co-Chief Executive Officer, and Chief Scientific Officer for Taza Aya

Wearable Technologies and Design of PPE
Lucy Dunne
Professor, Department of Design Innovation
Co-Director, Wearable Technology Lab
University of Minnesota

Regulatory Pathways and Standards
Sundaresan Jayaraman
Professor
School of Materials Science and Engineering
Georgia Institute of Technology

12:20 p.m. **Audience Q&A** (25 min)

12:45 p.m. **BREAK** (30 min)

Session 7 **Implementation Considerations: Communications, Training, and Education Needs and Strategies** (60 min)

1:15 p.m. **Session Introduction** (5 min)

Bethany Boggess Alcauter, Planning Committee Member
Director of Research and Public Health Programs
National Center for Farmworker Health

- *Explore strategies to improve health communication and information accessibility for farm workers.*
- *Highlight successful training and education programs that have changed behavior and increased PPE adoption.*
- *Identify needs of both trainers and workers to enhance training and education effectiveness, and provide space for multi-stakeholder reflection on gaps, opportunities, and innovations.*

1:20 p.m. **Panel Presentations** (40 min)

Health Communications and Information Accessibility
Sara Floor
Creative Unit Supervisor
California Department of Public Health

Lisbeth Gall
Associate Director of Population Health Programs
National Center for Farmworker Health

Training and Education Programs
Carolyn Sheridan
Executive Director/Founder
Ag Health and Safety Alliance

Jenna Gibbs
Director of Operations
Ag Health and Safety Alliance

2:05 p.m. **Audience Q&A** (15 min)

Session 8 **Optimizing PPE for High-Risk Farm Settings: Next Steps Stakeholder Roundtable** (75 min)

2:15 p.m. **Session Introduction** (5 min)

Michael Payne, Planning Committee Member
Dairy Outreach Coordinator
Western Institute for Food Safety and Security
Director, California Dairy Quality Assurance Program

- *Acknowledge this is an evolving issue with new scientific and social information constantly coming to the forefront.*
- *Acknowledge the societal public and animal health, food safety and security importance of PPE and infection prevention at the human-animal interface.*
- *Position PPE, not just a workplace issue, but as a national health and food security imperative.*
- *Introduce the One Health lens as the context in which these strategies must operate, connecting farm-level practices to national pandemic preparedness and food system resilience.*
- *Identify research investments, infrastructure, and cross-sector collaboration needed for pandemic preparedness.*

2:20 p.m. **Roundtable Discussion** (70 min)

Industry Stakeholders
Ashley Peterson
Senior Vice President of Scientific and Regulatory Affairs
National Chicken Council

Anja Raudabaugh
CEO
Western United Dairies

Oscar Garrison
Senior VP Food Safety Regulatory Affairs
United Egg Producers

Research Stakeholders
Edie Marshall
Branch Chief, Antimicrobial Use and Stewardship
California Department of Food and Agriculture

Public Health, Emergency Management, and Agricultural Department Stakeholders
Jennifer Nuzzo
Professor of Epidemiology
Director of the Pandemic Center
Brown University School of Public Health

One Health Experts
Meghan Davis
Associate Professor
Director of the Johns Hopkins P.O.E. Total Worker Health Center in Mental Health
Johns Hopkins Bloomberg School of Public Health

Day 2 Wrap-Up (30 min)

3:30 p.m. **Sponsor Closing Remarks** (15 min)

Maryann D'Alessandro
Director
National Personal Protective Technology Laboratory (NPPTL)
National Institute for Occupational Safety and Health (NIOSH)
Centers for Disease Control and Prevention (CDC)

3:45 p.m. **Workshop Closing Remarks** (15 min)

Shawn Gibbs, Workshop Chair
Dean, School of Public Health
Dean's Chair and Professor of Environmental and Occupational Health
Texas A&M University

4:00 p.m. **ADJOURN**

NATIONAL ACADEMIES Sciences Engineering Medicine

Personal Protective Equipment for Influenza A (H5N1) in High-Risk Farm Settings: A Workshop

PROJECT STATEMENT OF TASK

A planning committee of the National Academies of Sciences, Engineering, and Medicine will organize a virtual public workshop to examine personal protective equipment (PPE) needs and best practices to protect workers in high-risk U.S. farm settings and control Influenza A (H5N1) transmission between livestock and humans. This workshop will provide the opportunity to exchange knowledge and ideas among interested and impacted parties—including technical experts, policy makers, livestock industry leaders and farm owners, and PPE users in farm settings (e.g., farmworkers, veterinarians).

The workshop will feature invited presentations and discussions to:

- Examine the current state of knowledge on H5N1 transmission to humans (modes and high-risk activities) and implications for PPE use in high-risk farm settings, including the role of PPE relative to other kinds of controls (e.g., engineering, administrative);
- Examine existing recommendations, guidance, and best practices relating to use of PPE in high-risk farm settings and feasibility of their implementation, as well as approaches to better understand farmworker needs and overcome barriers to PPE use;
- Explore the potential alternatives to NIOSH-approved respirators in high-risk farm settings and implications for respiratory protection programs;
- Consider how novel technologies and approaches, including those designed to improve PPE selection, fit, and use, could enhance protection provided by PPE to farmworkers potentially exposed to H5N1 and needs and opportunities related to the evaluation of such technologies;
- Explore health communication, education, and training needs and approaches to improve the reach and accessibility of information regarding the importance of and best practices for PPE use for H5N1 in high-risk farm settings;
- Highlight key research needs to evaluate and improve the effectiveness of PPE when used in high-risk farm settings to protect workers and control the spread of H5N1.

The planning committee will organize the workshop, develop the agenda, select and invite workshop speakers and discussants, and moderate or identify moderators for the discussions. A Proceedings of a Workshop will be published to capture the presentations and discussions at the workshop. This Proceedings will be prepared by designated rapporteurs in accordance with National Academies institutional guidelines and will be released to the public.

SPONSOR

National Institute for Occupational Safety and Health's National Personal Protective Technology Laboratory

WEBPAGE

For additional information, please visit the project webpage.

PROJECT STAFF

Autumn Downey, Project Director (adowney@nas.edu)
Lisa Brown, Project Director (lbrown@nas.edu)
Emily Packard Dawson, Program Officer (EPDawson@nas.edu)
Rayane Silva-Curran, Senior Program Assistant (rsilvacurran@nas.edu)
Clare Stroud, Senior Director, Board on Health Sciences Policy (cstroud@nas.edu)

NATIONAL ACADEMIES Sciences Engineering Medicine

Personal Protective Equipment for Influenza A (H5N1) in High-Risk Farm Settings

A Workshop

PLANNING COMMITTEE ROSTER

Shawn Gibbs, Ph.D., MBA, CIH (Chair)
Dean, School of Public Health
Dean's Chair and Professor of Environmental and Occupational Health
Texas A&M University

Bethany Alcauter, Ph.D.
Director of Research and Public Health Programs
National Center for Farmworker Health

Jeffrey Bender, D.V.M., M.S.
Professor, School of Public Health
University of Minnesota
Director, Upper Midwest Agriculture Safety and Health Center (UMASH)

Douglas Chapin
Owner, Chapin Family Farms, LLC
Board Chairman and Member, Michigan Milk Producers Association
Board Director, National Milk Producers Federation

Herek Clack, Ph.D., M.S., SB
Associate Professor
Department of Civil Environmental Engineering
University of Michigan

Michelle Kromm, D.V.M., M.P.H., MAM
Principal
Food Forward, LLC

Beth Lipton, D.V.M., M.P.H.
Washington State Public Health Veterinarian
Washington State Department of Health

Matthew Nonnenmann, Ph.D., M.S.
Professor
University of Nebraska Medical Center

Michael Payne, Ph.D., D.V.M.
Dairy Outreach Coordinator
Western Institute for Food Safety and Security
Director, California Dairy Quality Assurance Program

Anabel Rodriguez, Ph.D., M.P.H.
Assistant Professor
Department of Environmental and Occupational Health
Texas A&M University School of Public Health

Matt Spencer, CSP, SHRM-CP, REM
Vice President, HR & Safety Programs
U.S. Poultry & Egg Association

Ximena Vergara, Ph.D., M.P.H.
Chief, Hazard Evaluation System and Information Service
California Department of Public Health
Adjunct Assistant Professor of Epidemiology
University of California, Los Angeles – Fielding School of Public Health

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A Workshop

PLANNING COMMITTEE BIOSKETCHES

SHAWN GIBBS (CHAIR), PH.D., MBA, CIH, is Dean of the Texas A&M University School of Public Health. Shawn has over a hundred articles in industrial hygiene and environmental exposure assessment, focused on disrupting transmission of high consequence infectious diseases. He is on the Board for Global EHS Credentialing and the Texas Health Institute and the NIOSH Board of Scientific Counselors. He was a Member of Clinical Laboratory Improvement Advisory Committee Biosafety Working Group, USEPA Board of Scientific Counselors for Homeland Security and the Southeastern Conference (SEC) COVID-19 Medical Task Force. He was a U.S. Faculty Fulbright Scholar to Egypt and has been PI of three Fulbright Junior Faculty Development Programs (Egypt and Libya). He received the American Industrial Hygiene Association's Edward J. Baier Technical Achievement Award, the Board for Global EHS Credentialing BGC Impact Award, Southeastern Conference's Michael L Slive Distinguished Service Award, and the APHA Eula Bingham Award for Excellence in OHS Education and Training. His research has explored exposures associated with bioaerosols in confined feeding operations. His research has helped to determine national policies, procedures, and best practices for response to Ebola virus disease, COVID-19, mpox, Lassa Fever, and other high consequence infectious diseases. With the Nebraska Biocontainment Unit, he actively led and executed the aeromedical evacuation, ground transportation, and safety and risk reduction involved in the subsequent treatment of confirmed and under investigation patients with Ebola virus disease. Shawn has held roles in organizations, such as National Emerging Special Pathogens Training and Education Center, Hispanic Health Disparities Research Center, Central States Center for Agricultural Safety and Health, Center for Population and Aging, and Director of Research for the Nebraska Biocontainment Unit. He is a national leader in public health education, research, training, and policy related to national and international responses to high consequence infectious diseases, including aeromedical evacuation isolation, waste management, decedent care, and occupational safety and health.

BETHANY ALCAUTER, PH.D., is the Research and Public Health Programs Director at the National Center for Farmworker Health, based in central Texas. She directs a national program focused on reducing the burden of emerging and re-emerging infectious diseases among farmworkers as part of a cooperative agreement with the Centers for Disease Control and Prevention. She has focused on community-based participatory research with farmworkers, construction workers, and landscapers around health and labor structure topics. She has also led national mass media campaigns for immigrant farmworkers, developed workplace safety trainings, and implemented partnerships with industry associations and employers. She has received the Lorin Kerr Award by the Occupational Health and Safety Committee of the American Public Health Association and the Health and Safety Innovation Award by the National Council on Occupational Safety and Health. She is an advisory board member for the High Plains Intermountain Center for Agricultural Safety and Health and the Great Lakes Center for Farmworker Health and Wellbeing, and is a board member of the Texas Center for Local Food. She holds a BS in community health, an MPH in epidemiology, and a PhD in occupational epidemiology from the University of Texas Health Science Center.

JEFFREY BENDER, D.V.M., M.S., is a Professor in the Division of Environmental Health Sciences in the School of Public Health and the Director of the National Institutes of Occupational Safety and Health-funded Upper Midwest Agriculture Safety and Health Center. He also is an Adjunct Professor in the College of Veterinary Medicine serving as the hospital epidemiologist. The focus of his career has been on emerging issues that affect both animal and human health. As an infectious disease epidemiologist with 25 years of post-graduate experience, he has directed and collaborated on a broad range of research and surveillance projects pertaining to infectious and specifically zoonotic diseases (i.e., influenza and foodborne diseases). His research is multidisciplinary, requiring collaboration among government officials, industry, and community-based organizations. He also has served on policy-making bodies designing programs to address emerging issues in public health, such as food safety, antimicrobial resistance, prevention of zoonotic influenza and enteric pathogens linked to human-animal contact. Dr. Bender also served as the Director of the USAID-funded EPT2 One Health Workforce Project at the University of Minnesota, a project focused on capacity building to detect, respond to, and prepare for emerging pandemic threats.

DOUGLAS CHAPIN owns and operates Chapin Family Farms LLC with his wife Cheri and son Sam. Chapin Family Farms is a commercial dairy farm in Mecosta County, Michigan. The dairy grows all forage for the dairy and raises all of its heifers. Mr. Chapin has served as Board Chairman of Michigan Milk Producers Association since 2020. He also serves on the National Milk Producer Federation's (NMPF's) Executive Committee. He is also a member of NMPF's Animal Health and Wellbeing Committee. Mr. Chapin has been awarded Dairy Farmer of the year by Michigan State University, has been a National winner for NMC's quality award and was awarded Dairy Communicator of the year for efforts on H5N1.

HEREK CLACK, PH.D., SB, is an associate professor of civil & environmental engineering at the University of Michigan. At U-M, his group focuses on chemical and biological aerosols and their interactions with electric fields and electrical discharges. He is the recipient of the XVI Distinguished Young Alumni/ae award (MIT, 2000), the NSF CAREER Award (NSF, 2004), the Harry J. White Award for Outstanding Achievement in the Science and Application of Electrostatic Precipitation (Int'l Soc. for Electrostatic Precipitation, 2013), and the Kenneth M. Reese Outstanding Research Scientist Award (University of Michigan College of Engineering, 2019). He is vice-president and a member of the Board of Directors of the International Society for Electrostatic Precipitation (ISESP); serves on the Awards and Representation & Equity Affairs committees of the American Association for Aerosol Research; and is co-founder and chief science officer of the startup company Taza Aya Inc. He earned an S.B. in Aeronautical and Astronautical Engineering from MIT (1987) and an M.S. (1997) and Ph.D. (1998) in Mechanical Engineering from the University of California, Berkeley. He has served on numerous National Research Council committees addressing environmental issues ranging from the implications of changes to the regulations governing power plant emissions to the safe and ethical thermal destruction of both conventional munitions and chemical warfare agents by the U.S. military.

MICHELLE KROMM, D.V.M., M.P.H., MAM, is a board-certified poultry veterinarian with over 15 years of experience in food safety, emergency disease management, and antimicrobial stewardship. She earned her Doctor of Veterinary Medicine and Master of Public Health degrees concurrently from Iowa State University and the University of Iowa in 2006, followed by a master's degree specializing in poultry medicine from the University of Georgia in 2007. After completing her education, Dr. Kromm joined Jennie-O Turkey Store, a Hormel Foods subsidiary, as a staff veterinarian. She advanced through multiple leadership roles, ultimately becoming Vice President of Animal Health and Welfare at Hormel Foods in 2019. In this role, she managed animal health, welfare, and preharvest food safety programs. Dr. Kromm has contributed to multiple task forces and committees focused on food safety, antimicrobial resistance, and emergency disease preparedness. Notable committees include the Executive Committee of National Turkey Federation, National Institute for

Antimicrobial Resistance Research and Education and multiple American Veterinary Medical Association committees. Her consulting practice, Food Forward LLC, is dedicated to enhancing food system resilience through strategic risk mitigation, with a focus on food safety, animal health, and sustainability.

BETH LIPTON, D.V.M., M.P.H., is the State Public Health Veterinarian with Washington State Department of Health. She has over 17 years of experience in local and state governmental public health and seven years of experience in clinical veterinary practice as both a mixed and small animal veterinarian. Her current role primarily involves zoonotic and vector borne disease surveillance, prevention and outbreak response and addressing emerging diseases and issues from a One Health perspective. Dr. Lipton is part of a core team involved with highly pathogenic avian influenza (HPAI) preparedness and response among various animal species and settings in Washington state as well as participating in national groups to discuss approaches to HPAI. Dr. Lipton served as President of the National Association of State Public Health Veterinarians during 2023−2024. She was previously a six-year member of the Board of Directors for the Washington State Public Health Association. Dr. Lipton received her DVM degree from Tufts University School of Veterinary Medicine and MPH from University of Washington School of Public Health.

MATTHEW NONNENMANN, PH.D., CIH, is a professor of Environmental, Agricultural and Occupational Health at the University of Nebraska Medical Center. His long-term goal is to protect public health through research that (i) advances the science to characterize human exposure to bioaerosols (e.g., measles virus) (ii) advances the science of exposure control to bioaerosols through engineering, administrative or personal protection solutions. Dr. Nonnenmann has technical training and experience in industrial hygiene, microbiology techniques, exposure assessment, and the use of ventilation systems to aerosolize and measure virus aerosols. He has over 25 years of exposure assessment experience primarily in agricultural work settings, but more recently in health care. His research involves the characterization of bioaerosol hazards in healthcare and agricultural settings and constructing systems to aerosolize virus to simulate human cough. Dr. Nonnenmann has fulfilled the roles of PI, Project Leader or Co-Investigator on several university, and Centers for Disease Control and Prevention (i.e., National Center for Emerging and Zoonotic Infectious Disease and National Institute of Occupational Safety and Health)-funded grants. Specifically, he has completed funded projects developing a coughing machine to aerosolize live virus (CK000557/CK18-001). In addition, he has ongoing projects evaluating UVC light to inactivate virus aerosols (CDC-1 U54 CK000448-01) and is the PI on a CDC/NIOSH funded project to design/develop/install/evaluate a bioaerosol control ventilation system in animal production (e.g., U254OH007548). He is a PI on an Outreach project to disseminate PPE to dairy and poultry farms in response to H5N1 (CDC/NIOSH - 1U54OH010162 – Central States Center for Agricultural Safety and Health (Rautiainen, Center PI) - Distribution of worker educational materials and personal protective equipment in response to Highly Pathogenic Avian Influenza (HPAI) in dairy and poultry production).

MICHAEL PAYNE, PH.D., D.V.M., holds a doctorate in both veterinary medicine and pathology, Dr. Payne is employed as a food animal researcher and outreach coordinator at the University of California's School of Veterinary Medicine. Dr. Payne has also previously served in positions in private practice and university cooperative extension. Dr. Payne's current research focuses on livestock and poultry mortality management during catastrophic natural disasters and disease events. He also directs the largest statewide continuing education program for dairy producers, the California Dairy Quality Assurance Program. The program provides free continuing education to the entirety of California's dairy producers, on issues including livestock and employee health, environmental sustainability, farm security and producer wellness. The program has received numerous state, federal and industry awards. Relative to this activity's tasks, Dr. Payne has been the Vet School's point person for HPAI outreach including worker safety. He coordinates weekly with both the California Department of Food and Agriculture and the California Department of Public Health on HPAI issues. His explanations have been featured on numerous print and broadcast media pieces including the NY Times, LA Times, Boston Globe, BBC, NPR, ABC, NBC and CBS.

ANABEL RODRIGUEZ, PH.D., M.P.H., is involved in research, outreach, and training efforts that have focused on improving occupational health, safety, and well-being among Spanish and Indigenous-speaking agricultural working populations in rural regions. Most recently, her work has focused on identification and prevention of tuberculosis and influenza, health service access in health 'deserts', including, vaccine access, utilization, hesitancy, and systemic barriers, education on vaccine-preventable infectious diseases, pandemic relief payments for wages lost, and understanding social determinants of health associated with agricultural occupations (i.e., dairy farm workers, fresh fruit and vegetable, seasonal, migrant, and H-2A visa guest farmworkers, and sorting and grading bodega workers) in the Texas Panhandle and U.S.-Mexico border communities of the Rio Grande Valley and El Paso. Dr. Rodriguez is the proud daughter of Mexican immigrants and seasonal migrant farmworkers from the Rio Grande Valley.

MATTHEW SPENCER, CSP, SHRM-CP, REM, is currently the Vice President HR and Safety Programs for the U.S. Poultry & Egg Association. Since starting this position in 2017, he has been responsible for the strategic management of certain USPOULTRY technical services provided to or on behalf of Association members. Such professional services include, but are not limited to, worker safety, human resources, fleet safety, and employment law programs. Mr. Spencer provides technical and logistical support to the Joint Poultry Industry Safety & Health, Human Resources, and Duck Councils. He represents USPOULTRY on various outside committees or boards, such as the NFPA 55 Industrial and Medical Gases, 150 Animal Housing, and 660 Agricultural Dust technical committees, ANSI Z490.1 and ANSI Z16 advisory committees, the Agricultural Safety and Health Council of America (ASHCA) board of directors, and the NIOSH National Occupational Research Agenda Councils for Manufacturing and Agriculture, Forestry, and Fishing. Mr. Spencer assists in developing program areas related to educational programs for the International Processing and Protein Expo (IPPE) and provides other IPPE support. He prepares comments and articles for risk management positions of the Association.

XIMENA VERGARA, PH.D., M.P.H., is the Chief of the Hazard Evaluation System and Information Service section at the California Department of Public Health Occupational Health Branch where she uses her training in epidemiology, industrial hygiene and chemistry to tackle new and unrecognized occupational hazards. Dr. Vergara has a keen interest in applying exposure assessment and epidemiologic methods to public health problems, most recently focusing on infectious diseases in the workplace including COVID-19. She is an Adjunct Assistant Professor of Epidemiology at the University of California, Los Angeles in the Fielding School of Public Health. Dr. Vergara received her Master of Public Health and Doctor of Philosophy degrees at the University of California, Los Angeles. She also earned her Bachelor of Arts at the University of Chicago.

Personal Protective Equipment for Influenza A (H5N1) in High-Risk Farm Settings

A Workshop

SPEAKER BIOSKETCHES

JOE ARMSTRONG, D.V.M., is a member of the Zoetis Dairy Technical Service Team and focuses on helping dairy and beef operations with the practical application of evidence-based medicine and management. With Zoetis, he is responsible for providing technical support to Minnesota, western Wisconsin, and northeast Iowa. Joe received his bachelor's degree in biology from the University of Minnesota-Morris in 2011. He graduated from the University of Minnesota-College of Veterinary Medicine in 2015. After veterinary school, Joe worked as a private practitioner with beef and dairy farms at Anderson Veterinary Service in Zumbrota, MN. Dr. Joe then worked as the Cattle Production Systems Extension Educator at the University of Minnesota. Joe lives in the Twin Cities of MN with his wife, who is also a veterinarian, and his two children.

MARTIN J. CARRASQUILLO-MANGUAL, M.S., P.A.S., is a Dairy Educator with Michigan State University Extension, where he has spent the past eight years supporting dairy farms across Michigan. His work blends research-based expertise with practical on-farm experience. Focusing on workforce education, he supports dairy workers to increase their skills and knowledge. He also develops educational materials for producers in herd management, feeding strategies, and overall farm efficiency. Originally from Puerto Rico, Martin grew up on the family's farm, sparking his passion for animal agriculture. He earned a bachelor's degree in biology from the University of Puerto Rico–Cayey and a master's degree in animal science, with a concentration in dairy nutrition, from Michigan State University. Throughout his career, Mangual has presented at state and national conferences on dairy management & nutrition, workforce development, and sustainable practices. He is committed to providing accurate, accessible information to farmers and to highlighting the essential role of agriculture in food security and community well-being. Mangual believes the future of dairy farming lies at the intersection of science, education, and people—empowering both farm businesses and their workforce to thrive.

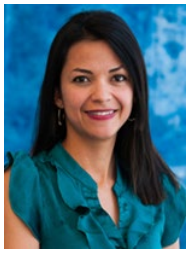
LUS CHÁVEZ, AAS, BAAS, is a former respiratory therapist who transitioned into education, where she discovered her passion for working with migrant families. Her background in healthcare and education gives her a unique perspective on the challenges faced by this community, inspiring her to focus on public health initiatives that bridge gaps in access and equity. Today, she is dedicated to creating partnerships that uplift ag workers in the Texas Panhandle and promote healthier, more resilient communities.

CAPT JAMES COBURN, M.SC, is a Portfolio Lead for the Scalable Solutions Office within the Advanced Research Projects Agency for Health (ARPA-H), where he focuses on medical manufacturing advancements and supply chain resilience. He is on Detail from his position as Senior Advisor for Emerging Technologies in the FDA's Office of the Chief Scientist, where he leads a team that increases the Agency's experience with cross-cutting advanced manufacturing and emerging technologies in pursuit of accelerated technology adoption and a more robust medical supply chain. He also coordinates with industry and government groups on supply chain resilience for medical products. He was previously the Medical Manufacturing Innovation Lead for the White House Office of Science and Technology Policy (OSTP). He received his BSc and MSc in Mechanical Engineering from Brown University and is a recognized expert in additive manufacturing for medical products. In his role in the Public Health Service, CAPT Coburn deploys to disasters and outbreak zones where agile processes and digital systems can help to improve the response.

MEGHAN F. DAVIS, DVM, Ph.D., M.P.H., is an Associate Professor and Doctoral Program Director in Environmental Health and Engineering at Johns Hopkins Bloomberg School of Public Health (BSPH). She directs the Johns Hopkins P.O.E. Total Worker Health Center in Mental Health, which takes a holistic approach to the health and well-being of workers, particularly frontline workers in agriculture, healthcare, and service sectors. She received her D.V.M. from the University of California at Davis School of Veterinary Medicine in 2000, and her M.P.H. and Ph.D. from BSPH in 2008 and 2012, respectively. Prior to her faculty career, she has over a decade of experience in veterinary medicine, including dairy practice. She also served on the NASEM Planning Committee for a workshop on Potential Research Priorities to Inform Readiness and Response to Highly Pathogenic Avian Influenza A (H5N1). Her research is grounded in One Health efforts that promote transdisciplinary, systems-thinking efforts towards improved human health, animal health and environmental health.

LUCY DUNNE, PH.D., is currently a Professor at the University of Minnesota, where she chaired the School of Apparel Design from 2011-2024 and co-directs the Wearable Technology Lab. She holds degrees in Apparel Design (BS 2002, MA 2004, Cornell University, Ithaca, NY, USA), Electronic Technology (AAS 2004, Tompkins-Cortland Community College, Cortland, NY, USA). and Computer Science (Ph.D. 2007, University College Dublin, Dublin, Ireland). Her research focuses on textile- and garment-based wearable technologies, human factors of wearable systems, and manufacturing and use of next-generation clothing. She is a co-author (with Susan Watkins) of "Functional Apparel Design: From Sportswear to Space Suits" (Bloomsbury, 2015), and she has received the National Science Foundation's CAREER award and the NASA Silver Achievement Medal for her work with functional clothing and wearable technology.

SARA FLOOR, M.A., is an award-winning communications strategist with more than two decades of experience in public health, life sciences, public affairs, agriculture and local government. Career highlights include leading culturally responsive outreach to the agriculture community during California's bird flu epidemic, helping CA counties navigate the COVID-19 public health crisis, creating the campaign to secure $6 billion for broadband infrastructure and more. She recently completed UC Davis' master's level Certificate in Public Health program and holds a master's in public communication from Fordham University.



LISBETH GALL, M.A., is the Associate Director of Population Health Programs at the National Center for Farmworker Health (NCFH). She oversees public health training programs for special populations, language access programming, development and dissemination of health education materials, and referral and information services for farmworkers and their families. Lisbeth is a native of Guatemala and has nearly fifteen years of experience working internationally and in the U.S. on public health, education, and social programs with marginalized populations. She has extensive experience in project management, training program design and evaluation, and adult education. She currently serves as a board member of the North Carolina Farmworker Health Program (NCFHP), a statewide Migrant Health Voucher Program within the North Carolina Office of Rural Health. Lisbeth holds a bachelor's degree in social work with a focus on development management and a master's in international training & education from American University.

OSCAR GARRISON is a food safety expert and a Senior Vice President of food safety and regulatory affairs at United Egg Producers. He oversees EggSafety.org, ensuring all content, videos, blogs, and FAQ answers are up-to-date and accurate. Garrison, along with UEP's Food Safety Committee, works closely with regulatory officials from the FDA and USDA to develop guidance for farmers on producing safe, wholesome eggs. UEP's food safety team also works with an advisory board of food safety experts for access to the most recent research, technology, and protocols for the food industry. A key member of the UEP team since 2013, Garrison has extensive food safety experience. He worked for over 19 years at the Georgia Department of Agriculture, serving as Division Director of Food Safety and Assistant Commissioner of Consumer

Protection. He is the past president of the Association of Food and Drug Officials, where he led the national organization's efforts to promote an Integrated Food Safety System. Garrison was also president of the Georgia Association of Food Protection and is currently on the Educational Advisory Board for the Food Safety Summit.

CAPT JOHN GIBBINS, D.V.M., M.P.H., serves as senior veterinary adviser to the Office of Agriculture Safety and Health at the Centers for Disease Control and Prevention's National Institute for Occupational Safety and Health. Earlier in his career, he was in mixed animal and emergency clinical medicine practice for six years; served nine years as a public health officer, flight commander, and an infectious disease analyst in the Air Force; and was chief veterinary officer for the United States Public Health Service. Dr. Gibbins is a diplomate of the American College of Veterinary Preventive Medicine (ACVPM) and an honorary diplomate of the American Veterinary One Health Society.

JENNA GIBBS, M.P.H., PH.D., is a distinguished expert in agricultural health and safety, holding a Ph.D. in Industrial Hygiene from the University of Washington and a Master's in Public Health from the University of Iowa. For six years she has been the Director of Operations for the Ag Health and Safety Alliance, where her work focuses on developing and leading national and international outreach programs in agricultural safety with high emphasis on personal protective equipment training. For example, she organizes Respirator Fit Test Workshops specifically tailored for agricultural workers. Her expertise extends to developing novel educational materials, such as a 360-degree video series on PPE donning/doffing and graphic novel illustrations on PPE selection and care. Dr. Gibbs is a passionate outreach specialist and has expanded the Gear Up for Ag™ program to West Africa.

RICHARD GORDON, MSEE, is the co-founder and CEO of Air99 LLC, where he drives innovation in respiratory protection. He holds an M.S.E.E. from Stanford University and began his career as a high-end microprocessor designer at AT&T Bell Laboratories before becoming a serial entrepreneur in electronic design automation, cloud-based SaaS, and origami-inspired engineering. Richard's commitment to respiratory protection began in 2013 while living in China with his family. Faced with hazardous air pollution, he struggled to find an N95 mask that would fit and protect his six-year-old son. Wearing masks daily himself, he experienced the flaws in conventional designs. Aware of the potential for a future pandemic and how N95 masks could be critical to blocking airborne transmission, he set out to engineer a better solution. That effort led to the Airgami® breathable, high-filtration, origami mask, for which he holds a patent. Air99 brought Airgami into production in time to serve tens of thousands of customers during COVID-19, providing protection that fit better, worked better, and looked better than traditional masks. Airgami earned top prizes in the 2019 Johnson & Johnson QuickFire Challenge, the 2021 and 2022 BARDA Mask Innovation Challenges, and the 2021 Good Design Award, and was featured in National Geographic, Science Magazine, and Scientific American. Today, Richard focuses on manufacturing automation and the challenges of producing advanced PPE in the United States.

CAITLIN GREEN, D.V.M., is a field veterinarian with five years of experience working with heavy toms in Michigan. She worked in animal research for six years before becoming a poultry veterinarian, where her focus is on education and preventative medicine. Throughout her career, PPE has been a daily necessity and struggle. The value and shortcomings of these items are a constant part of her work and training. She has been involved with many cases of H5N1 in Michigan, as well as providing training to state responders.

MA ELENA GUTIERREZ is the founder and executive director of Fe y Justicia, a grassroots immigrant rights organization in Central Minnesota. She empowers immigrant workers—particularly those in agriculture and meatpacking—to speak out, demand dignity, and shape policies that affect their lives. Originally from rural Mexico, Ma Elena immigrated to the U.S. after running a small shoe business and caring for her siblings as a teenager. Her own experiences of discrimination and exploitation in agriculture and hospitality inspired her to build a movement rooted in solidarity, storytelling, and collective power. Her organizing efforts have included sit-ins outside a sheriff's office and mobilizing community testimonies in support of "Driver's

Licenses for All." With the Bush Fellowship, Ma Elena is strengthening her leadership and organizational capacity while modeling sustainable movement work that unites immigrant communities and advances equity across Minnesota.

RACHEL HERLIHY, M.D., M.P.H., is the State Epidemiologist and Deputy Chief Medical Officer at the Colorado Department of Public Health and Environment. Dr. Herlihy directs medical and epidemiologic activities for the Department, including communicable disease reporting, surveillance, and investigation efforts. She led Colorado's epidemiologic response to the COVID-19 pandemic. Dr. Herlihy represents the Department in a variety of settings, including legislative and executive hearings, as a lead media spokesperson, and with various technical and lay audiences. She has been with the Department since 2011 and has been Colorado's State Epidemiologist since 2017. Rachel earned her M.D. and B.S. degrees in Bacteriology, and Medical Microbiology and Immunology at the University of Wisconsin. She completed an internal medicine internship at the University of Virginia and a preventive medicine residency at Johns Hopkins University, including an MPH from the Johns Hopkins Bloomberg School of Public Health. Previously, Rachel was the Deputy State Epidemiologist for Utah and the Deputy Director for the Department of Defense's Infectious Diseases Clinical Research Program in Bethesda, Maryland.

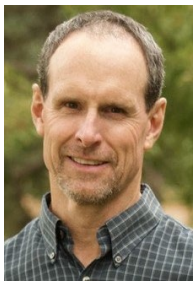
CAPT STACY HOLZBAUER, D.V.M., M.P.H., DACVPM, is a CDC Career Epidemiology Field Officer assigned to the Minnesota Department of Health. She currently serves as the State Public Health Veterinarian and leads the scientific and surveillance activities of the Zoonotic Diseases Unit and is a public health liaison to animal health regulatory agencies, animal industries and others who work at the interface of human and animal health. She graduated from South Dakota State University and Iowa State University College of Veterinary Medicine. After working as a large animal veterinarian in Iowa, she received her MPH from the University of Iowa College of Public Health. She then completed the Association of Teachers of Preventative Medicine fellowship at the Centers for Disease Control and Prevention (CDC) and the CDC Epidemic Intelligence Service (EIS) program.

SUNDARESAN JAYARAMAN. PH.D., is a Professor in the School of Materials Science and Engineering at the Georgia Institute of Technology. Prior to joining Georgia Tech in 1985, Professor Jayaraman had the privilege of working at Software Arts, Inc. with Dan Bricklin and Bob Frankston, the Co-Creators of the world's first spreadsheet – VisiCalc®. Professor Jayaraman and his research students have made significant contributions in the following areas: (i) Smart Textile-based Wearable Systems; (ii) Engineering Design and Analysis of Intelligent Textile Structures and Processes; (iii) Computer-aided Manufacturing and Enterprise Architecture Modeling; and (iv) Design and Development of Respiratory Protective Devices. Professor Jayaraman received the 1989 Presidential Young Investigator Award from NSF and was elected a Fellow of the Textile Institute, (UK), in 1994. He received the 2018 and 2020 Textile Institute Research Publication Awards for the most outstanding paper published in 2018 and 2020 in the Journal of the Textile Institute, and is a co-recipient of the NAM Catalyst Award in the Healthy Longevity Global Grand Challenge in 2023. Professor Jayaraman received his PhD from NCSU in 1984. He is a founding member of the NASEM Standing Committee on Personal Protective Equipment in the Workplace (COPPE) and the National Materials and Manufacturing Board. He currently serves as the Chair of COPPE. He has served on nine NASEM Study Committees.

SEEMA LAKDAWALA, PH.D., is a molecular virologist who began her training at the Salk Institute and continued at the NIH, where in 2009 she started studying the airborne transmission of emerging influenza viruses. Her early work led to key discoveries, including identifying the presence of influenza viruses in aerosols of various sizes and defining the soft palate as a critical site for viral adaptation and transmission. In 2015, Dr. Lakdawala launched her independent research program at the University of Pittsburgh School of Medicine and later moved her lab to Emory University in 2022. Her lab investigates influenza virus transmission, pathogenesis, and assembly across multiple scales. They use advanced microscopy and biochemistry to study viral replication, animal models to explore transmission barriers, controlled human infection models to examine release of infectious respiratory particles, and environmental engineering approaches to assess virus persistence in air. She founded and co-directs the Emory Center for Transmission of Airborne Pathogens (C-TAP). During the COVID-

19 pandemic, the Lakdawala Lab helped assess the impact of public health interventions at community levels, developing an interactive dashboard—PHIGHTCOVID.org—to guide national policy decisions. Recently, the lab has focused on the H5N1 outbreak, studying the presence of infectious virus in air and wastewater on farms, how prior immunity to seasonal H1N1 affects disease severity, and the persistence of H5N1 in milk on shared surfaces. Dr. Lakdawala frequently speaks to the media on respiratory virus transmission and has coauthored several high-impact reviews, including in Science and Annual Review of Virology. She is the recipient of the 2020 ASV Ann Palmenberg Junior Investigator Award, a co-organizer of the 2020 National Academies workshop on SARS-CoV-2 airborne transmission, and a 2024 Kavli Fellow. Learn more at www.LakdawalaLab.com.

AMY K. LIEBMAN, M.P.A., M.A., has over three decades of experience and leadership advancing worker health and safety through community and clinical programs, research, and policy initiatives. She has been a leader at Migrant Clinicians Network since 1999 and is currently the Chief Program Officer. She has established nationally recognized training and technical assistance programs with community-based organizations and health centers. She works with the National Institute for Occupational Safety and Health (NIOSH)-funded Agricultural Safety and Health Centers, fostering inclusion of farmworker initiatives. She is the Associate Director of the Upper Midwest Agricultural Safety and Health Center (UMASH), where she successfully served as the co-PI for the Center's dairy worker projects that delivered culturally and linguistically contextual health and safety interventions to dairy workers in Wisconsin and Minnesota. This work included the development of a curriculum and supporting resources as well as close collaboration with agricultural industry leaders, dairy producers and workers. The National Safety Council applauded these efforts with its Stakeholder Collaboration in Occupational Injury Research Award. Liebman has been a leading voice calling for farmworker education and protection regarding H5N1, quoted in the New York Times, PBS NewsHour, and the Guardian. Previously, Liebman directed award-winning environmental health projects along the US-Mexico Border; spearheaded policy efforts within the American Public Health Association to support the protection of farmworkers; and served on the federal advisory committee to the EPA Office of Pesticide Programs. Her programs have won several awards. In 2024 she was honored with the Shelley Davis Humanitarian Award for her commitment to improving farmworker health and safety. Liebman has a master's degree from the LBJ School of Public Affairs at the University of Texas at Austin, and a Master's of Arts from the Institute of Latin American Studies at the University of Texas at Austin.



JASON LOMBARD, DVM, M.S., grew up in Colorado and spent his early years on his family's cattle ranch. After obtaining his DVM from CSU, he practiced primarily dairy cattle medicine in Wisconsin for almost 10 years. He returned to CSU and completed a master's degree in epidemiology while working for USDA's National Animal Health Monitoring System (NAHMS). He coordinated multiple National studies, primarily focused on the dairy industry. While with the USDA, he also participated in an Incident Management Team and was deployed for multiple cattle and poultry diseases during his 20-year federal career. Dr. Lombard moved to CSU in 2023. Since April of 2024, he has spent most of his time working to better understand HPAI in dairy cattle.

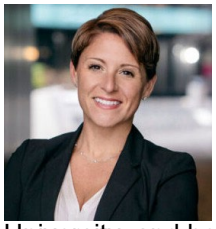
GINO LORENZONI, D.V.M., M.SC., PH.D., earned his DVM in Chile before pursuing advanced training in poultry health and production. He completed a master's degree at McGill University, focusing on ascites and oxidative stress; a Ph.D. at the University of Arkansas, where he studied ascites and the immune system of the avian respiratory tract; and postdoctoral training, also at Arkansas, investigating intestinal diseases and strategies to restore gut health. Following his academic training, Dr. Lorenzoni worked extensively with the global poultry industry as a technical advisor, supporting broiler and layer producers across Europe and the Americas. In 2017, he joined The Pennsylvania State University, where he teaches avian diseases to undergraduate and graduate students. His research program addresses major poultry health challenges, particularly necrotic enteritis and coccidiosis, while his extension efforts focus on training veterinarians and poultry professionals throughout Pennsylvania in the prevention, diagnosis, and control of avian diseases.

EDITH ("EDIE") MARSHALL, D.V.M., MPVM, DACVPM, is Branch Chief for the Antimicrobial Use and Stewardship program in the California Department of Food and Agriculture (CDFA). She became passionate about the human-animal interface and One Health while volunteering on a rabies vaccination project in Ecuador after high school. After attaining her DVM at Washington State University and practicing in mixed and small animal clinics, she went on to UC Davis to get her MPVM and then work for the university's Center for Animal Disease Modeling and Surveillance on foot-and-mouth disease models. After a few years, she started working with the Food & Agriculture Organization (FAO), focusing on prevention and control of H5N1 Highly Pathogenic Avian Influenza in Southeast Asia and China, while later working for FAO on projects in emergency preparedness, rinderpest, and pandemic H1N1 influenza. She followed with two years in the Former Soviet Union on an anti-bioterror project. After returning to the U.S., she supported the work of Washington State University's Paul G. Allen School for Global Health. Dr. Marshall started with the California Department of Food and Agriculture's Antimicrobial Use and Stewardship (AUS) program in early 2018. She has experience in the epidemiology and surveillance of influenza in domestic food animals, including H5N1, as well as programmatic expertise in managing animal disease research for the State of California. In August 2024, she was asked to lead the coordination of research into H5N1 infections of dairy cattle in California for CDFA.

ANNA MEYERHOFF is the bilingual farm safety coordinator at the New York Center for Agricultural Medicine and Health (NYCAMH) and the Northeast Center for Occupational Health and Safety in Agriculture, Forestry, and Fishing (NEC). Anna grew up on a dairy farm, lived and studied abroad in Central America, and earned a Bachelor of Arts in Spanish from SUNY Geneseo. She has spent the last two decades of her career teaching Spanish-speaking farmworkers. In her role at NYCAMH/NEC, Anna delivers trainings on pesticides, tractors, and other farm safety topics. She also teaches first aid, CPR and stress management. Anna creates easy-to-read bilingual print materials, conducts respirator fit testing, and helps farms choose appropriate personal protective equipment.

JENNIFER NUZZO, DR.P.H., is Professor of Epidemiology and Director of the Pandemic Center at Brown University School of Public Health. An epidemiologist by training, her work focuses on global health security, public health preparedness and response, and health systems resilience. Together with colleagues from the Nuclear Threat Initiative and Economist Impact, she co-leads the development of the first-ever Global Health Security Index, which benchmarks 195 countries' public health and healthcare capacities and capabilities, their commitment to international norms and global health security financing, and socioeconomic, political, and environmental risk environments. She also founded the Outbreak Observatory, which conducts, in partnership with frontline public health practitioners, operational research to improve outbreak preparedness and response. Prior to coming to Brown, Dr. Nuzzo was an Associate Professor at the Johns Hopkins Bloomberg School of Public Health and the Johns Hopkins School of Medicine. She was also a Senior Scholar at the Johns Hopkins Center for Health Security.

JIN PAN, PH.D., is an Assistant Professor in the Department of Occupational and Environmental Health at the University of Iowa, College of Public Health. Her research focuses on understanding the influence of environmental factors on disease transmission and human health. Specifically, her research utilizes multidisciplinary expertise to 1) investigate the interactions of current and emerging respiratory bacterial or viral pathogens and various environmental factors, with a focus on the indoor environment, to evaluate their risks of transmission; 2) develop and establish cost-effective sampling and surveillance system of respiratory diseases in indoor environment; 3) design, evaluate, and implement non-pharmaceutical approaches to mitigate respiratory disease transmission in indoor environment. Dr. Pan earned a PhD in Civil and Environmental Engineering at Virginia Tech, an MS in Civil and Environmental Engineering at the University of California, Berkeley, and a BEng in Building Science at Tsinghua University.



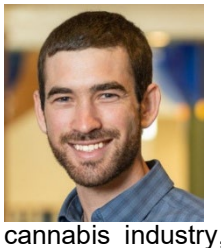
ASHLEY PETERSON, PH.D., as senior vice president of scientific and regulatory affairs, Dr. Peterson's responsibilities at the National Chicken Council include providing scientific and technical expertise on a variety of topics, including food safety, poultry inspection, and broiler health and welfare. For the last 14 years, she has been overseeing policy development and scientific initiatives within the regulatory agencies in Washington, D.C. Peterson came to Washington, D.C., as a Congressional Science Fellow in the U.S. House of Representatives. She earned her Ph.D. from the University of Maryland, her Master's from Michigan State University, and her Bachelor's from the University of Kentucky.

ANJA RAUDABAUGH, B.S.M.S. Biochemistry, has led Western United Dairies (WUD) for a decade. She was selected by a Board of Directors who represent dairy farmers across California. Anja is eager to advocate for dairy farming of all production styles, as WUD represents over 750 dairies in the largest dairy farming region in the world. As California's leading commodity, dairy farming serves the state's local nutrition programs and grows economic prosperity in the community. WUD works with regulators, politicians, and local officials to ensure that dairy farming meets California's high food production standards. Ensuring dairy farming thrives through community efforts to provide clean drinking water, meets air and water quality standards, and supports beautiful landscapes helps create and keep dairy investments in the state. WUD works with Californians every day to ensure dairy farmers protect the state's ecosystem while presenting the challenges of small business. Recently, Anja co-developed with the Department of Water Resources, the single largest water savings program in the history of western water -Landflex. Landflex worked directly with farmers to voluntarily surrender their use of overdrafted groundwater forever, providing strategic community economic stability in the face of drought or floods. WUD's strategic direction on water continues to be community-focused, low drama, highly measurable water quantity benefits, and ease of scale.
Prior to joining WUD, Anja worked for the Farm Bureau and managed the local Madera County Farm Bureau. In this capacity, Anja oversaw multiple water quality coalitions and litigation against government overreaching onto private property. In her earlier years, Anja worked for the U.S. House Agricultural Committee, the U.S. Office of Management and Budget, and U.S. Congressman Doug Ose. She helped author two farm bills and the largest specialty crop bill still in history (Specialty Crop Competitiveness Act). A biochemistry professional with a degree from the University of Pacific, Anja pursues strategic analytic approaches using data and fresh political perspectives and got her start reviewing prion protein diseases in cattle.

HEATHER RIDEN, M.A., is a distinguished professional in public health leadership. For the past 20 years, Riden has held key leadership positions where she has been instrumental in advancing programs that advocate for the health of underserved communities. Her expertise lies in program development, implementation, and evaluation, ensuring that health interventions are not only effective but also culturally and contextually appropriate. This extensive background provides a solid foundation for her current role as the Program Director for the UC Davis Western Center for Agricultural Health and Safety (WCAHS), where she addresses the unique occupational health challenges faced by farmworkers. At WCAHS, Riden oversees a wide range of programs, including research, outreach, and education, all designed to prevent work-related injuries and illnesses. She collaborates with diverse groups—from researchers and policymakers to farmworkers and growers—to create practical solutions that improve working conditions and promote a culture of safety. Her work includes developing and disseminating crucial information on emerging public health threats, such as H5N1 (avian influenza) to protect farmworkers and rural communities.

CAROLYN SHERIDAN, RN, BSN, is the Founder and Executive Director of the Ag Health and Safety Alliance™ (AgHSA), an international non-profit organization registered in the US and Canada. AgSHA, focuses on health and safety for the next generation of agriculture with programming tailored specifically to this audience. Carolyn grew up on a dairy farm in Northwest Iowa and continues to farm with her husband and children in the same area. Carolyn has more than 30 years of experience serving the agricultural population and performing outreach on multiple agricultural health and safety topics. As the developer of the agricultural health and safety college program (Gear Up for Ag Health and Safety™) in 1993, she has delivered the program to over 10,000 students and led the international expansion of the program. With more than two decades

of agricultural education experience, Ms Sheridan provides customized training in agricultural health and served as an instructor for the Agricultural Medicine-Occupational & Environmental Health Course for Rural Health Professionals training course (i.e., the Agriculture Safety and Health: Core Course) in several states across the nation. Her speaking engagements to local, state, regional, national and international audiences have included informing others about the need and availability of specific agricultural health services, the development of similar programs in other states and countries and the need for sustainability of the agricultural-specific health and safety programs. Carolyn serves on numerous advisory committees for NIOSH-funded agricultural health and safety centers and is dedicated to advancing the rural health and safety professional workforce by educating healthcare and safety professionals in agriculture.



ELON ULLMAN, M.S., CIH, is a Certified Industrial Hygienist and Research Scientist at the California Department of Public Health (CDPH). Before joining CDPH, he studied occupational noise exposure in the mining industry at the University of Michigan. His first role at CDPH was working on the COVID-19 response, focusing on indoor air quality and respiratory protection to prevent the spread of bioaerosols. His current role involves providing education to industries with newly recognized or previously under-addressed workplace health and safety risks. This includes H5N1 outbreaks on farms, silicosis in engineered stone fabrication shops, hazards in the cannabis industry, and valley fever among outdoor workers. He also focuses on bridging occupational and community health by adapting industrial control measures to health hazards that affect the general public. Of particular interest are the barriers that community members face when wearing respiratory protection for hazards such as airborne disease, wildfire smoke, and DIY projects.

BRENT WILSON
Wilson Centennial Farm
Member of the Michigan Milk Producers Association

Personal Protective Equipment for Influenza A (H5N1) in High-Risk Farm Settings

A Workshop

Workshop Resources Shared by Invited Speakers

- Ag Health and Safety Alliance. Resources LINK
- Air99 LLC – Airgami® Origami Mask LINK
- Bush Foundation – Ma Elena Gutierrez, 2025 Bush Fellow LINK
- CDC – Morbidity and Mortality Weekly Report. Cluster of Influenza A (H5) Cases Associated with Poultry Exposure at Two Facilities — Colorado, July 2024 LINK
- CDC – Morbidity and Mortality Weekly Report. Serologic Evidence of Recent Infection with Highly Pathogenic Avian Influenza A(H5) Virus Among Dairy Workers — Michigan and Colorado, June–August 2024 LINK
- CDPH – California Department of Public Health. Bird Flu Toolkit LINK
- Emory University – The Lakdawala Lab LINK
- Emory University – Center for Transmission of Airborne Pathogens (CTAP) LINK
- Minnesota Department of Health – Current Avian Influenza A (H5N1) Outbreak LINK
- MINNPost – After losing a family member to cancer, Waite Park advocate hopes new MinnesotaCare access for undocumented residents will save lives LINK
- MPRnews – A medical haven for Latino immigrants in rural Minnesota LINK
- NCFH – National Center for Farmworker Health, Inc. Avian Influenza H5N1 “Charla” Training for Animal Production Workers (flip chart) LINK
- NCFH – National Center for Farmworker Health, Inc. What is H5N1 Bird Flu? What dairy and poultry workers should know (flyer) LINK
- NCFH – National Center for Farmworker Health, Inc. Dairy workers are at risk for H5N1 Bird Flu – How to protect yourself from the virus at work (flyer) LINK
- Scheftel, J. M., Schenk, K. E., Bauck, L. J., Bye, M. L., Ireland, M. J., Klumb, C. A., Kollmann, L. M., Smith, K. E., Voss, S. J., Hoefs, B. L., Hunt, L. J., & Holzbauer, S. M. (2025). Human Health Surveillance During Animal Disease Emergencies: Minnesota Department of Health Response to Highly Pathogenic Avian Influenza Outbreaks, 2015 and 2022-2023. *Journal of Agromedicine*, *30*(3), 591–602. LINK