



ANNUAL REPORT 2021-2022

September 15, 2021 – September 14, 2022

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High Plains Intermountain Center for Agricultural Health and Safety

LETTER FROM THE DIRECTOR

Though this year was again marked with on-going Covid-19 challenges, I'm proud to say that we adapted to meet our mission to conduct robust research, outreach, and education to improve the safety and health of workers in agriculture and forestry across our region. This report will recap the final year of our current research projects, which over the last six years focused on dairy worker safety and youth safety. Read more about those projects and our growing outreach work in the pages to follow, but here are few highlights.

This year we welcomed Dr. Anita Alves Pena as the director of our Pilot/Feasibility Program. Pena is a Professor of Economics at Colorado State University with research interests in public sector economics, labor economics, and economic development. She is a past HICAHS Pilot Grant recipient herself! We are grateful to Dr. Jessica Elf and Dr. Andreas Neophytou for their service as co-directors of the program.

We were finally able to celebrate the 30th anniversary of the High Plains Intermountain Center for Agricultural Health and Safety this year! In June we gathered with current and past collaborators to toast to our accomplishments. While we still have work to do, it was important to look back on what we have done and give thanks for all those who have contributed.

Though 30 years have passed, the words of Founding Director, the late Dr. Roy Buchan, still ring true:

"Perhaps the most fundamental activity in any society is food production. [We are] dedicated to the improvement of the health, safety and wellbeing of the residents of Colorado, the high plains, and the Rocky Mountain Region."

The Covid-19 pandemic has challenged us all, but I am proud that our team continues to fully embrace this mission.



Stephen Reynolds, Director
Professor , Environmental and Radiological Health Sciences
Colorado State University



Current and past faculty and staff pose during a happy hour celebrating the center's 30th anniversary on June 13, 2022.

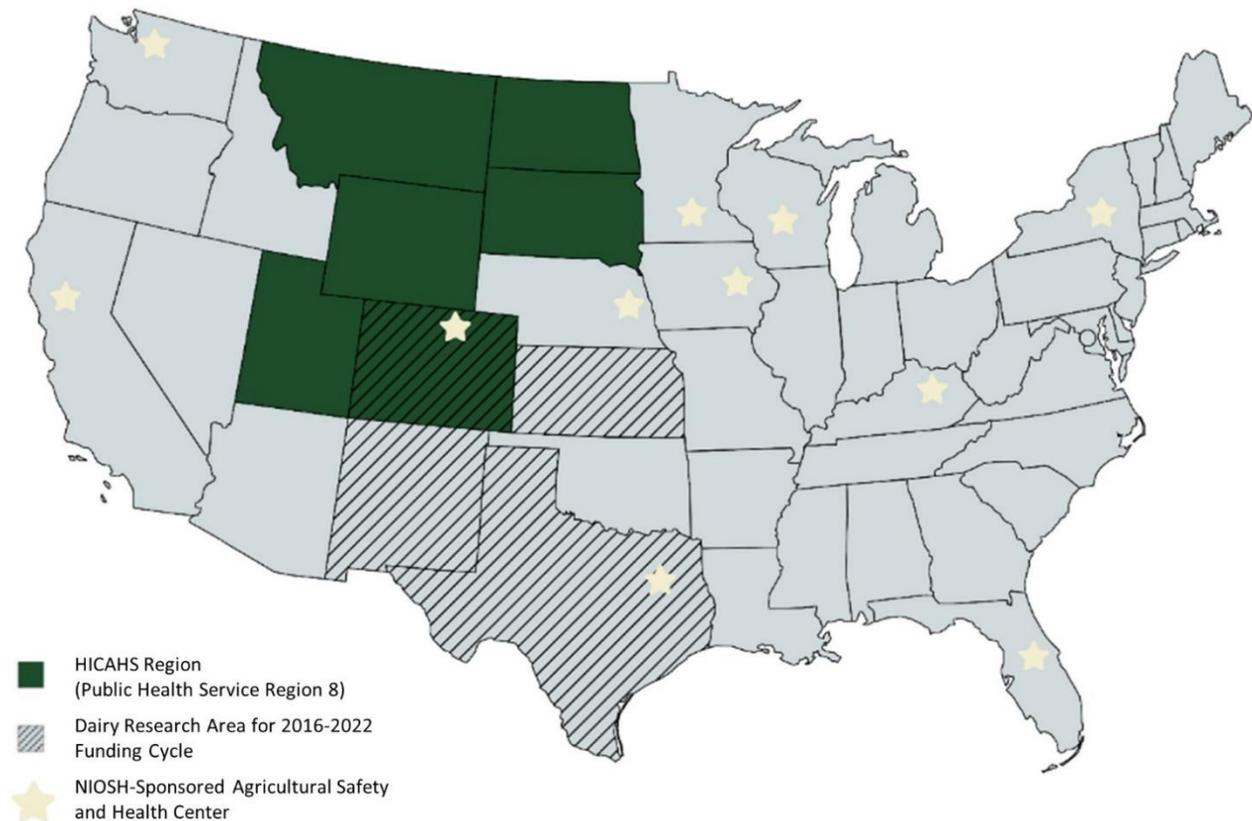


Dr. Anita Alves Pena is the new director of the Pilot/Feasibility Program.

THE HICAHS REGION

HICAHS Vision Statement, 2016-2022:

“To be the preeminent scientific authority, resource, and site for innovative strategies that improve the health and safety of agricultural and forestry workers and their families in the high plains intermountain region and beyond.”



The HICAHS region...

- Contains 152,620 farms and ranches.
- Employs over 300,000 workers (hired, migrant, and unpaid laborers).
- Contains 212 million acres of farmland, with the average agricultural production operation having 1,391 acres. This is 24% of the nation's farmland!
- Produces one-third of U.S. wheat cash receipts.
- Produces \$9.9 billion in cash receipts annually from the sale of cattle and calves. This is nearly 15% of all annual cattle and calf sales in the U.S. and is the largest single-commodity revenue source in the HICAHS region.

Data compiled from the United States Department of Agriculture, 2018 Census of Agriculture

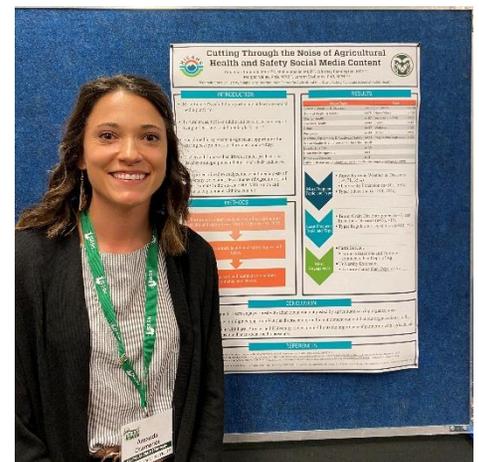
ADMINISTRATIVE CORE UPDATES

This year the HICAHS team hosted the annual conference of the International Society of Agricultural Safety and Health (ISASH) on campus at Colorado State University June 12-16, 2022, with the theme “From pastures to processing: Connecting people to elevate health & safety across the food system.” The 2022 conference was the first in-person meeting in three years, offering much desired opportunity for the 130 conference attendees to connect in ways the Covid-19 pandemic has made difficult. The HICAHS team led the planning and execution of the entire five-day conference, which included three plenary panels, 30 poster presentations, 52 oral presentations, two professional development workshops, and tours of nine local agricultural sites and organizations that are part of the local food system. HICAHS team members were honored to receive awards during the conference, including HICAHS Deputy Director Dr. Lorann Stallones, who received the Research Achievement Award; Center Coordinator and Evaluator Dr. Morgan Valley and Outreach Coordinator Whitney Pennington who were awarded the President's Award of Outstanding Service, and Outreach Graduate Research Assistant Amanda Otamendi, who received the ISASH Student Award.

This year, HICAHS also hosted two virtual events with the International Dairy Research Consortium (IDRC). The first event, hosted on October 5, 2021, included 15 researchers and practitioners from five countries. During this event, attendees shared recent work and research, identified needs in dairy safety and health research, and strengthened connections with collaborators. For the second event, hosted on August 23, 2022 as part of the Public and Occupational Health in Sustainable Agriculture hybrid conference, HICAHS Associate Director Dr. David Douphrate and Dr. Laura Pulscher, University of Texas Medical Branch at Galveston, presented a session titled “One Health in the Dairy Industry: Employing a One Health Approach in Studying Cross-species Influenza D Infections on Dairy Farms.”

The HICAHS Evaluation team continues to track the center’s outputs (see page 8) and determine the worker health and safety needs in the region. In the past year, the evaluation team continued to collaborate with colleagues from the other U.S. Agricultural Health and Safety Centers in the program-wide evaluation projects developing a Contribution Analysis on cross-center activities to reduce tractor overturn fatalities through Rollover Protective Structure (ROPS) research and programs.

This year, the HICAHS team successfully submitted a competitive renewal application, which resulted in the award of funding from the National Institute for Occupational Safety and Health for research and outreach activities for another five years. We aim to continue our work to improve the health, safety and wellbeing of agricultural and forestry workers in Colorado, Montana, North Dakota, South Dakota, Utah, Wyoming and beyond.



Four HICAHS team members received awards during the 2022 ISASH Conference: Dr. Lorann Stallones (left), Dr. Morgan Valley and Whitney Pennington (center), and Amanda Otamendi (right).

CORE RESEARCH PROJECT UPDATES

Occupational Safety Management and Leadership on Large-Herd Dairy Farms

David Douphrate – Texas A&M University

Building on previous research on the occupational health and safety training needs of this primarily immigrant workforce, Dr. David Douphrate and collaborators aimed to design and implement a supervisor training program to increase the safety leadership skills of supervisors and improve safety culture on the dairy overall. In total, 103 front-line dairy supervisors from dairy farms in New Mexico, Texas, Colorado, and Kansas, have been enrolled, and 73 have completed the 13-module training intervention program that was designed during the first year of the project.

The study's findings suggest the safety leadership and management training intervention resulted in significant increases in multiple safety climate dimensions among both dairy supervisors and their subordinates. Additionally, the training intervention resulted in increased daily safety leadership behaviors among dairy supervisors. The project team is currently preparing three manuscripts for publication.

The research team, led by Dr. Douphrate, leveraged this project to secure a US Department of Agriculture grant, which educates dairy owners, managers, and workers on Covid-19. This project has been completed and a manuscript is being prepared for publication.



Two supervisors participate in the training.

Nasal Intervention Study

Stephen Reynolds and Joshua Schaeffer – Colorado State University

The HICAHS Bioaerosol Research Team is wrapping up their evaluation of a nasal rinse to reduce inflammation in the upper airways of dairy workers. In addition to a decrease in inflammatory markers when using the nasal rinse, the team has observed the presence of bacterial and viral pathogens in the nose of dairy workers. One pathogen of interest is influenza D, as it has potential to be a threat to human health. Further, the presence of these pathogens may be influenced by the diversity of the bacterial communities naturally present in the worker's nose. The team is in the final stage of recruiting dairies to participate in the study. To date, the team has enrolled 45 participants.



Analysis of nasal samples in the laboratory for the presence of bacteria

Agricultural Safety Education Initiative

Michael Pate – Utah State University

This project seeks to increase youth farm safety behaviors by engaging agricultural education teachers in Montana, South Dakota, and Utah in annual training. Having completed teacher trainings, this year Dr. Michael Pate and collaborators sought to qualitatively describe students' production-based agricultural experiences as coded by NASS Commodity codes, describe students' safety reporting using Supervised Agricultural Experience (SAE) journal entries, and quantify teachers' workshop participation as related to student safety reporting. To describe the program adoption and implementation, all electronic SAE journal entries from Utah, Montana, and South Dakota were coded with the safety curriculum during 2021-22 school years.

Findings of note include:

- 782 journal entries were reviewed: 266 from Montana, 334 from Utah, and 161 from South Dakota;
- 332 journal entries were associated with students whose teacher participated in the training program;
- Most student journal entries focused on machinery operations, with 109 journal entries reporting the use of tractors;
- 33 journal entries specifically reported safety as the main topic;
- Most agricultural production work reported in student journal entries was associated with hay production.



Utah ag education teachers participate in the 2018 (top) and 2019 (bottom) training

This year Dr. Michael Pate and project co-investigator Dr. Rebecca Lawver received awards from the Utah Association of Career and Technical Education. Dr. Pate received the Teacher Educator of the Year award, and Dr. Lawver was named the Postsecondary Educator of the Year. Congratulations to both!



Dr. Michael Pate, project principal investigator, assists teachers during the 2019 (left) and 2021 (right) teacher trainings.

SMALL GRANT PROGRAM UPDATES

Emerging Issues

The Emerging Issues Grant Program provides a structure for HICAHS to identify and respond to issues of high priority for regional producers. This year HICAHS Leadership Team reviewed and funded three projects under the direction of the Emerging Issues Program Lead, Dr. Morgan Valley. The Emerging Issues Program also extended funding to three projects to complete work following Covid-19 delays.

Table: Emerging Issues Grants funded between 9/15/2021 to 9/14/2022.

Project Title	Principal Investigator
Piloting a Regional Respiratory Protection Education and Fit Testing Model for Pesticide Applicators in Colorado's Marijuana Industry	Annyce Mayer, MD, MSPH, Division of Environmental and Occupational Health Services, National Jewish Health
Project Protect Food Systems Workers: Project Protect Promotora Network in Rural Colorado	Angeles Mendez, Project Protect Food Systems
Understanding the Mental Health Safety Net for Farmworkers in Colorado and Utah	Adrienne "Annie" Keeney, PhD, San Diego State University

Emerging Issues Project Brings Pesticide Safety Education to Applicators Nationwide

Extending work on his 2020 Emerging Issues Grant project, this year Dr. Michael Wierda developed two self-paced online respiratory safety courses for pesticide applicators. Since federal pesticide application safety training and certification regulations are implemented at the state level, nationally targeted trainings face numerous bureaucratic barriers to implementation. Wierda negotiated a revenue-sharing model to overcome some of these barriers and enhance training utilization across the county.

Highlights of the two nationally applicable courses include that they are:

1. Designed to meet the EPA's 50-minute continuing education requirement;
2. Available on Extension Foundation Campus, a national online learning platform;
3. Part of a revenue-sharing plan that supports Pesticide Safety Education Programs (PSEPs); and
4. Free to view (for educational purposes only) on the [USU PSEP YouTube](#) channel.

"While I'm proud of the courses, I am particularly happy about the revenue-sharing plan that supports Pesticide Safety Education Programs (PSEPs). I created the courses to be nationally applicable but didn't want them to compete with other states' PSEPs. Thus, I set up a system where other state PSEPs will receive 20% of the revenue. Therefore, these courses will support state PSEPs monetarily."

~Dr. Michael Wierda, Utah State Extension

Community-Initiated Grants

Under the direction of Dr. John Rosecrance, the Community-Initiated Grants Program continues to provide funding to agricultural and forestry organizations to help them improve their health and safety programs. The program funded five projects this year.

Table: Community-Initiated Grants funded between 9/15/2021 to 9/14/2022.

Project Title	Recipient
Expanding Health Education for Migrant and Seasonal Agricultural Workers in Montrose and Delta Counties, Colorado	Olathe Community Clinic, River Valley Family Health Centers
From Farm to Kitchen: Safety Work Design	Cultivating Connections Montana
Logging Safety Conference and Expansion of Safety Video for Logger Safety Training Program	Montana Logging Association
On-Farm Safety Kit Protect	Utah State University Extension
Reducing Farmworker Risk of Injury and Heat-Related Illness	Colorado Fruit and Vegetable Growers Association

Pilot/Feasibility Grants

Under the direction of Dr. Anita Alves Pena, the Pilot/Feasibility Program awarded one new grant and extended funding to three projects to complete their work following Covid-19 delays.

This year, Dr. Michael Thomas completed work on his 2019 project “Impact of Occupational Exposures and Hazards on Brain and Cognitive Health among Aging Agricultural Workers.” As part of the project, the team published “Risk Factors for Brain Health in Agricultural Work: A Systematic Review” in the *International Journal of Environmental Research and Public Health*. The review found that neurological disorders were associated with agricultural exposures to toluene, pesticides, heavy metal or dust exposure, work with farm animals, and nicotine from plants. Dr. Thomas and colleagues proposed that future work examine the effects of moderators such as type of work, sex, migrant status, race, and age and that researchers use more comprehensive brain imaging studies, both observational and experimental, involving several imaging techniques to inform strategies to protect brain health among agricultural workers.

Table: Pilot/Feasibility Grants funded between 9/15/2021 to 9/14/2022.

Project Title	Recipient
Health Effectiveness of Trained Community Lay Workers on Glycemic Control, Knowledge, and Self-Efficacy among Agricultural Workers with Diabetes in the Texas Panhandle	Anabel Rodriguez, PhD Assistant Professor, University of Texas Health Science Center at Houston School of Public Health

OUTREACH CORE

Despite Covid-19 surges impacting travel in late 2021 and early 2022, the Outreach Team attended a dozen in-person events across Colorado and Wyoming, providing resources and education in English and Spanish. In response to new regulations in Colorado, heat-illness prevention and reducing stooped postures in agricultural work were of particular focus in education and training.

Social media and digital media are still a vital way to reach audiences across the region with information about HICAHS research and evidence-based practices. The Outreach Team maintains active Facebook, Instagram, and Twitter accounts and sends quarterly updates via electronic newsletter. Digital content was seen more than 80,000 times this year.

While social media presents a significant opportunity to share best practices for farm and ranch safety, strategic practices need to be used to enhance message dissemination. This year, HICAHS Graduate Research Assistants, Amanda Otamendi and Mollie Brazile, conducted a social media listening project to identify specific social media content gap areas and engaging content producers. This work found that health and safety content posted by University Extension and Farm Bureau pages received high engagement, which highlights the importance of partnering with these organizations to enhance HICAHS social media presence.

Additionally, the U.S. Centers for Agricultural Safety and Health joint YouTube channel hosts 29 videos produced by HICAHS or with HICAHS funding. These videos were viewed 171,000 times this year for a total watch time of near 20,000 hours. Videos on the safe use of chainsaws are the most frequently viewed.



Outreach Coordinator, Whitney Pennington, and Extension Intern, Chasel Valdiviezo-Perez, provide safety resources at the Northern Colorado Migrant Worker Appreciation Picnic.



Outreach Coordinator, Whitney Pennington (right center), presents best at the Colorado Fruit and Vegetable Growers Association 2021 Labor Conference.

Table: HICAHS Outputs for 9/15/2021 to 9/14/2022.

Output Type	Number of Outputs
Publications (Peer-Reviewed Journal Articles)	8
Trade Publications	1
Conference Papers, Presentations, and Abstracts	8
Trainings or non-conference presentations	12
Editorial and Editorial Board Service Appointments	5

HICAHS RESEARCHERS AND STAFF

Leadership and Administrative Personnel

Director: Stephen Reynolds, Colorado State University

Deputy Director, Evaluation & Outreach Programs Lead: Lorann Stallones, Colorado State University

Associate Director: David Douphrate, Texas A&M University

Community-Initiated Grants Program Lead: John Rosecrance, Colorado State University

Pilot/Feasibility Grants Program Director: Anita Alves Pena, Colorado State University

Outreach Program Coordinator: Whitney Pennington, Colorado State University

Coordinate, Evaluator & Emerging Issues Program Lead: Morgan Valley, Colorado State University

Evaluator: Annie Keeney, Colorado State University

Financial Manager: Sarah Halsted, Colorado State University

Students and Post-Docs

Amy Blom, Masters Candidate, Colorado School of Public Health at Colorado State University

Mollie Brazile, Doctoral Candidate, School of Education, Colorado State University

Federica Masci, Visiting Post-Doctoral Fellow

Denali Sanders*, Masters Candidate, Colorado State University

Amanda Otamendi, Masters Candidate, Colorado School of Public Health at Colorado State University

Chasel Valdiviezo-Perez*, Undergraduate Researcher, Colorado State University

**Participated in HICAHS projects but did not receive financial or tuition support via HICAHS*

Research Core Key Personnel & Contributors:

**denotes contributor*

Occupational Safety Management and Leadership on Large-Herd Dairy Farms

David Douphrate, Principal Investigator, UTHealth School of Public Health, San Antonio
Noa Román-Muñiz, Colorado Dairy Extension, Colorado State University
Robert Hagevoort, New Mexico/Texas Dairy Extension, New Mexico State University
Luis Mendonca, Kansas Dairy Extension, Kansas State University
Stephen Reynolds, Colorado State University
David Gimeno, UTHealth School of Public Health, San Antonio
Anabel Rodriguez, UTHealth School of Public Health, San Antonio
***Lisa Pompeii**, Baylor University
***Peter Kines**, National Research Centre for the Working Environment (Denmark)
Paul Edwards, Dairy New Zealand
Rick Naerebout, Idaho Dairy Association

Agricultural Safety Education Initiative

Michael Pate, Principal Investigator, Utah State University
Dustin Perry, Montana State University
Scott Smalley, Iowa State University
Rebecca Lawver, Utah State University
***Alyx Shultz**, Montana State University (Evaluation Consultant)

Evaluation of Effectiveness of a Nasal Rinse Intervention to Reduce the Pro-Inflammatory Response in Dairy Workers Exposed to Bioaerosols

Stephen Reynolds, Principal Investigator, Colorado State University
Joshua Schaeffer, Principal Investigator, Colorado State University
Kenneth Jones, Principal Investigator, University of Oklahoma Health Sciences Center
Jessica Liebler, Boston University School of Public Health
Gregory Gray, Duke University
***Jill Poole**, University of Nebraska Medical Center
***Julia Sharp**, Colorado State University
***Zachary Weller**, Colorado State University
Mary Bradford, Research Associate, Colorado State University
Grant Erlandson, Doctoral Candidate, Colorado State University
James Seidel, Doctoral Candidate, Colorado State University
Yin Hitn Wang, Research Associate, Colorado State University

For investigator contact information, please visit www.hicaahs.colostate.edu or email HICAHS@colostate.edu.

HICAHS ADVISORY BOARD MEMBERS

As HICAHS finishes its final year of the 2016-2022 cycle, the HICAHS Leadership Team acknowledges with gratitude the service of long-time advisory board members who completed their terms, including Ragan Adams, Shawn Archibeque, Keith Belk, Kevin Dole, Jeff Edwards, Alvaro Garcia, Herb Gibson, Paul Gunderson, Robert Hagevoort, Dan Hair, David Knell, Jessica Lemmel, Matt Nonnenmann, Brian Schiller, and Mike Taylor. Bethany Boggess Alcauter, Juan Velez, and Peter Kolb will continue to serve on the HICAHS advisory board for the next cycle alongside nine new board members. Each of the 2016-2022 board members, listed below, helped improve HICAHS' efforts and supported the health and safety of agricultural workers across the region.

Cooperative Extension & Academia

Ragan Adams, Veterinary Extension Specialist, Clinical Science, Colorado State University

Shawn Archibeque, Associate Professor, Animal Sciences, Colorado State University

Keith Belk, Professor, Animal Sciences, Colorado State University

Jeff Edwards, Pesticide Applicator Training Coordinator & State Small Acre/Horticulture Specialist, University of Wyoming Extension

Alvaro Garcia, Professor/Agriculture & Natural Resources Program Director, Dairy and Food Science, South Dakota State University

Paul Gunderson, State University System of North Dakota, *Retired*

Robert Hagevoort, Associate Professor/Dairy Extension Specialist, Animal Sciences and Natural Resources, New Mexico State University

Peter Kolb, Associate Professor/Forestry Extension Specialist, Forest Management, Montana State University

Matt Nonnenmann, Associate Professor, Occupational and Environmental Health, Great Plains Center for Agricultural Health, University of Iowa

Agricultural Producers

Jon Slutsky, Owner, La Luna Dairy

Juan Velez, VP Farm Operations, Aurora Organic Dairy

Agriculture-Related Businesses, Non-Profit Associations, & Faith-Based Organizations

Kevin Dole, Owner, Alpha Technology USA Corp

Jessica Lemmel, Director of Communications, Colorado Livestock Association

Mike Taylor, Chief Safety, Health & Environment Officer, The Church of Jesus Christ of Latter-day Saints: Risk Management Division

Government

Herb Gibson, Area Director, Denver Area Office, Occupational Safety and Health Administration, *Retired*

Health Care

Bethany Alcauter, Director of Evaluation & National Agricultural Worker Health Program, National Center for Farmworker Health

Insurance & Workers' Compensation

Dan Hair, Senior VP/Chief Underwriting and Safety Officer, Workers Compensation Fund, *Retired*

David Knell, Safety Consultant, Pinnacol Assurance

Brian Schiller, VP/Agribusiness Department, Flood and Peterson