2017 Annual Report
(September 15, 2016 – September 14, 2017)
CDC/NIOSH Cooperative Agreement No. 2 U54 OH008085
HICAHS helps Dairy Farms Develop Comprehensive Safety Management Programs

Idaho dairy farms are facing increased regulatory scrutiny following two worker fatalities on farms this year involving dairy lagoons. Because of these recent events combined with increased consumer concern for worker welfare in the industry, the Idaho Dairymen’s Association has launched a multi-year initiative to address worker safety on dairy farms throughout the state. The Idaho Dairyman’s Association (IDA) is taking a proactive approach by partnering with HICAHS personnel Drs. David Douphrate and Robert Hagevoort to implement a comprehensive safety management program on IDA member farms. To facilitate this ambitious initiative, the IDA has hired a full-time safety trainer with the goal of providing safety training and consultation to all 500 IDA farm members. The IDA has joined with other industry partners, including dairy processing corporations, to fund this ambitious project. Because of their efforts in improving the health and safety of dairy workers throughout the nation, Drs. Douphrate and Hagevoort have been asked to serve on the National Milk Producer Federation task force on dairy worker safety and welfare.

HICAHS 2016-2021 Vision:
“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.”

David Douphrate (L) and Robert Hagevoort (C) provide consultation to a Kansas dairy farmer and farm employee while at the site of a manure lagoon, September 2015.
Image Credit: Allison Cassidy

Front Cover: Robert Hagevoort delivers live animal handling safety training to dairy workers in New Mexico.
Image Credit: David Douphrate
HICAHS Administration, Planning, and Evaluation Core

An Introduction from the Director…

In 2017 HICAHS initiated the first year of our most recent competitive renewal with funding from NIOSH for 2016 through 2021. We have experienced a few significant changes in 2017. Vicky Buchan retired and Louise Quijano also left our Evaluation Program. Lorann Stallones stepped up to serve as Lead for the Evaluation Program as well as the Outreach Core. Following an addition to her family, Allison Cassidy has dropped to part time to focus on outreach. Elizabeth Brooks, who goes by Ellie, is our newest team member and has assumed a role combining HICAHS Administration Coordinator and Research Laboratory Manager. She holds responsibilities on several HICAHS projects, a small role with the Mountains and Plains Education and Research Center, as well as helping out with other areas of research where needed. She is no stranger to Colorado State University and has worked as a full-time researcher in pre-clinical tuberculosis research lab since 2006, prior to joining our team. She earned her BS in Microbiology and a MS in Toxicology and enjoys problem-solving. Her extensive energy and ability to integrate in have already helped our center.

HICAHS 2016 – 2021 has a new structure which is visible on page 10 of this report. We continue to emphasize our work with highly engaged partners in the U.S. dairy industry, as well as continuing Dr. Ayers’ work on ROPS. We have also launched a
new Agricultural Safety Education Initiative led by Dr. Pate. It’s exciting to see significant growth of our work with the logging industry through the HICAHS Community grants, and wider ranging efforts through the Emerging Issues grants.

Finally, I’d like to thank our External Advisory Board and all of the important partners who help keep us focused on efforts that can make a real difference for stakeholders in our region and beyond.

The Agricultural Safety Education Initiative is utilizing geospatial data mapping as an evaluation tool to observe, conceptualize, validate, and communicate health and safety program impact in the region. Training sites and teacher participation maps are shown in this map. Credit: Sophia E. Linn, GISP Assistant Director, Geospatial Centroid at CSU

The HICAHS Emerging Issues Program has $50K that can be awarded on an annual basis. Currently awarded are two emerging issues projects – one with the University of Wyoming and another with the U.S. Dairy Education & Training Consortium (USDETC). The University of Wyoming project focuses on “Assessing Worker Perceptions of Health and Safety Risk in Beetle-Killed Forests” – i.e. are the risks different from healthy forests. The goal is to generate hypotheses regarding risk-behavior for design of intervention strategies. The project with USDETC builds on our successful work with Dr. Robert Hagevoort at the New Mexico State University to develop and deliver training for dairy workers incorporating human and cow health. Funds were awarded to develop dairy stockmanship vignettes for a novel mobile employee training tool. Funds from carryforward have also been committed to Dr. Schaeffer (CSU) to build on research concerning bioaerosol exposures and lung disease experienced by dairy workers.

The HICAHS Evaluation Program has new leadership under Lorann Stallones and has greatly increased its staffing for the next five years. Annie Keeney continues to work as a HICAHS Evaluator for the Admin Core. Dr. Keeney received her Ph.D. from the CSU School of Social work this past spring, and has worked on HICAHS evaluation for the past five years under the leadership of Drs. Vicky Buchan and Louise Quijano. Cheryl Beseler, Ph.D., also joined the HICAHS Evaluation Team. Rhonda Miller, Ph.D, from Utah State University and Alyx Shultz, Ph.D., Murray State University, conduct evaluation for the Agricultural Safety Education, (ASE) Initiative project and Sophia Linn from the Geospatial Centroid at Colorado State University provides GIS services.

Health and Safety Outreach
The HICAHS Outreach Program has merged with the Community-Initiated Grants Program for the new 2016-2021 grant cycle. With $200,000 in direct costs granted for HICAHS Outreach, our team has expanded to include Lorann Stallones, Outreach Program Lead, Allison Cassidy, Program & Outreach Manager, John Rosecrance, Community Grants Lead, David Gilkey, Community Grants Co-Leader, Brian Kim, PhD student, Elise Lagerstrom, PhD student, and Taylor King, MPH student. Our new HICAHS Research Manager and Admin Coordinator Elizabeth Brooks, MS has been assisting the outreach team through social media promotion.

Ms. Cassidy is leading the Evaluators, Coordinators, and Outreach (ECO) group conference calls for the U.S. Agricultural Safety and Health Centers, beginning August 2017. The ECO group was founded by Ms. Cassidy, Diane Kampa, and Julie Rainwater in 2012 and has grown to include 66 people. The ECO group is a cross-center forum to share program methods and expertise and peer mentoring to new personnel in the Ag Centers. Recent training sessions included Altmetrics (Feb 2017), Social Media Analytics (May 2017), Contribution Analysis (June 2017), and Cost Analysis for Evaluation (August 2017), and Outreach (Oct 2017).

The ECO Awareness Team promoted Ag Safety Awareness Week from March 5-11, a “Beat the Heat” campaign throughout the summer, and National Farm Safety and Health Week from September 17-23. We have expanded our social media reach by creating a Facebook and Instagram account. Ms. Cassidy, Ms. Brooks, and Mr. Kim have formed a social media team to manage the accounts.

Ms. Cassidy continues to work on promoting agricultural health and safety practices through a leadership role in the U.S. Agricultural Safety and Health Centers YouTube channel (www.youtube.com/usagcenters). The YouTube channel surpassed 100 videos in August 2017. The videos on the channel have had over 120,000 views, 265,000 minutes watched, and 597 subscribers.

The Ag Centers created a fact sheet on the Ag Center program successes. Ms. Cassidy created a story on the dairy industry, which was voted for inclusion in this year’s fact sheet. In addition, she and student Taylor King created state-specific fact sheets on HICAHS projects, which can be viewed at www.hicahs.colostate.edu/resources.html. HICAHS student Taylor King has taken over production of the HICAHS newsletter, under the direction of Lorann Stallones and editing by Allison Cassidy (starting July 2017).
Ms. Cassidy led a campaign to increase the number of newsletter subscribers to all 11 of the Ag Center newsletters and other ag safety and health organizations. The campaign led to 70 people subscribing or updating their preferences.

The Community Grants Program continues to offer up to $15,000 to agriculture or forestry organizations looking to do health and safety projects. ATV safety projects have been funded through the community grants program for years. A HICAHS Collaboration with Ken Nelson has yielded at least nine separate safety Presentations. This reached over 750 individuals and was given to a range of audiences from employees using ATV’s to junior high and high school students, these were all within the state of Montana, but there are discussions to expand further.

HICAHS Board Member Peter Kolb, pictured here, was a recipient of a Community-Initiated Grant to develop a chainsaw safety video. www.youtube.com/usagcenters
A video series on riding ATVs safely in agriculture has been created using the safety principles of the ATV safety Institute. View the series at [bit.ly/ATVsafetyVideosForAg](bit.ly/ATVsafetyVideosForAg). Through a partnership with the Center for Health, Work, and Environment (CHWE), an online learning course was created to complement the safety videos ([bit.ly/ATVtraining](bit.ly/ATVtraining)).

HICAHS plans to continue to fund Extension agents to take the ATV Safety Institute (ASI) course, which allows the trainee to train others in his/her community on ATV safety. Brian Kim, PhD student, is developing partnerships with Wyoming Extension, Montezuma County Colorado Extension and Boulder County Colorado Parks and Open Space. Elise Lagerstrom, PhD student, continues to work with the Montana Logging Association to improve their safety programs.

### Foldable ROPS Project

Paul Ayers has begun a new project titled, “Development of Engineering Controls to Reduce Foldable ROPS Overturn Fatalities.” A rollover protective structure (ROPS) provides operator protection in the event of a tractor overturn. Foldable ROPS (FROPS) are popular among tractors used in orchards because they allow the temporary lowering of ROPS to fit under low clearance structures and trees. Unfortunately, due to the difficulties in raising and lowering, foldable ROPS are typically they are left in the lowered position, reducing the protection of the operator during an overturn. This project will generate guidelines to ease the manufacture and implementation of the lift assist mechanism for foldable ROPS. It is imperative the lift assist mechanism does not alter the mechanical strength of the foldable ROPS.

A sensor system was developed to evaluate the FROPS actuation force and evaluate forces to raise and lower on 13 FROPS of varied sizes. A lift assist device...
was designed, developed and tested to ease the raising and lowering of the FROPS. This simple prototype device can raise and lower the FROPS from the operator seat, and using a counterbalance weight, reduces the operator effort.

**Dairy Farm Leadership Training**

Despite increasing herd sizes with increasing numbers of hired workers, over 95% of dairy farms in the U.S. remain private, family-owned operations. These small enterprises often have limited resources, and lack formalization of safety management. A five-year HICAHS project by David Douphrate titled, “Occupational Safety Management and Leadership on Large-Herd Dairy Farms” seeks to develop, deliver and evaluate a safety management and leadership training intervention for large-herd dairy supervisors. In the first year of the project, a training needs assessment was conducted via informal interviews of dairy owners and managers in Texas, New Mexico, Kansas, Colorado and Idaho. Data collected will be used to develop a three-month training program that will be delivered to front-line supervisors beginning in 2018.

**Training for Dairy Farm Workers via iPads**

Dr. Douphrate continues to provide dairy worker safety training in multiple states. Over the past three years, safety training has been delivered to 2,090 dairy workers representing fifty eight dairy farms in seven states. Funding for this training was made possible through the OSHA Susan Harwood Grant Program. Additionally, HICAHS personnel continue to work closely with dairy producer associations to advance safety management practices on dairy farms.

**Agricultural Safety Education Initiative**
Machinery and agricultural vehicles account for 23% of fatal injuries to youth working on U.S. farms. The “Agricultural Safety Education Initiative” led by Michael Pate is assisting agriculture teachers in high schools in Montana, South Dakota, and Utah with training students on preventing agricultural injuries involving machinery. These teachers are able to provide students with career preparation through supervised agricultural experiences (SAE) provided by FFA. Supervised agricultural experiences allow students to gain work-based learning experiences and offer an opportunity to improve safety behaviors.

Trainings for the first year of the project have been completed in Montana, South Dakota, and Utah. Over 100 teachers attended. Teachers were provided demonstrations in hands-on activities to promote safe tractor use among youth. The focus was on rollover protection structures, guarding, and proper inspections to identify potential hazards with equipment. Teachers’ feedback was positive regarding the activities and indicated intentions to continue participation. Hazard and safety knowledge assessments indicated an increased hazard awareness of among teachers. Plans for the project include implementing a safety award program for youth participating in the work-based learning experiences offered by participating agriculture teachers.

**Pilot Program**

HICAHS awarded three new pilot proposals during the 2017 fiscal year. These proposals address a broad array of relevant agricultural health and safety topics: the characterization of firefighter exposures during controlled burns; the development of a reliable, wearable, and affordable air pollutant monitoring tool; and a laboratory investigation to elucidate the inflammatory mechanisms of agricultural dust inhalation.
public health in the Western U.S. Evolving land management practices and populations moving closer to the wildland-urban interface will increase the need for prescribed burn practices to reduce intensity of future wildfires. The firefighters who administered these prescribed burns are potentially exposed to high levels of smoke, thereby presenting an occupational health concern. The pilot proposal aims to address the utility of breathing zone measures of smoke and urinary levoglucosan to assess smoke exposure as well as characterize the impact of smoke exposure due to pile burn operations on lung function and inflammation of wildland firefighters.

Agricultural workers are often exposed to extremely high concentrations of aerosols. Despite the known and suspected detrimental health effects these agricultural workers experience, reliably establishing when and where these workers are exposed remains challenging. One factor contributing to this challenge is a lack of reliable and economic devices for quantifying real-time aerosol concentrations. Dr. Christian L’Orange, a research scientist in Mechanical Engineering at Colorado State University, was funded to develop such an instrument in his proposal, “A novel, low-cost method for assessing personal aerosol exposure in real-time.” The proposed study is evaluating the potential for future applications and deployments of the novel sensor, such as personal exposure assessment, evaluation of sufficient sample collection prior to

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Above Left: Researcher John Mehaffy works on the Air Testing Chamber while investigating different machine parts for the unit.  
Below: A prototype of the unit for assessment, and with it attached to an air sampling Pump- SKC Air Check 5000

Images Credited: Christian L’Orange
secondary analysis, and ultimately in reducing workers exposure to harmful pollutants by implementation of exposure mitigation steps.

A postdoctoral fellow at the University of Nebraska Medical Center, Dr. Tara Nordgren, was funded for her project, “Role of agricultural dust exposures on lung resident mesenchymal stem/stromal cell function.” Agricultural organic dust exposures trigger harmful airway inflammation, and workers experiencing repetitive dust exposures are at increased risk for lung disease. Mesenchymal stem/stromal cells regulate wound repair processes in the lung, and may contribute to either pro-resolution or pro-fibrotic lung responses. It is unknown how organic dust exposures alter this functioning, and how dust-mediated activation alters wound repair programs in the lung. Dr. Norgren plans to use these pilot data to support an R-series grant application to the National Institutes of Environmental Health Science; her long-term goal is to identify how agricultural exposures alter lung wound repair/remodeling processes to identify opportunities for improved prevention, intervention, and care of concentrated animal feeding operations (CAFO) workers.

Finally, the results from a 2015 pilot study ("Digital graphic novella: Hearing health for Spanish-speaking agricultural workers") by Associate Professor Mark Guiberson, Division of Communication Disorders at the University of Wyoming, were published in the American Journal of Audiology (September 2017, Vol. 26, 259-267). Dr. Guiberson’s preliminary study concluded that digital media may be an effective way to overcome language and literacy barriers with Spanish-speaking workers when providing health education and prevention efforts.

.References

HICAHS Staff Directory

HICAHS Director: **Stephen Reynolds**
HICAHS Deputy Director, Evaluation & Outreach Program Lead: **Lorann Stallones**
HICAHS Associate Director: **David I. Douphrate**
HICAHS Program and Outreach Manager: **Allison Cassidy**
HICAHS Admin Coordinator and Research Manager: **Elizabeth Brooks**

**Paul Ayers, PhD**
Principal Investigator of the project, "Development of Engineering Controls to Reduce Foldable ROPS Overturn Fatalities"
University of Tennessee, Knoxville
(865) 974-4942
ayers@utk.edu
bioengr.ag.utk.edu/

**Cheryl Beseler, PhD**
Evaluation Coordinator
Colorado State University
Department of Psychology
1879 Campus Delivery
Fort Collins, CO 80523-1681
(970) 491-3653
Cheryl.Beseler@colostate.edu

**Mary Bradford**
Research Associate, various projects
Colorado State University
College of Veterinary Medicine & Biomedical Sciences
1681 Campus Delivery
Fort Collins, CO 80523-1681
(970) 491-3633
Mary.Bradford@colostate.edu

**Elizabeth Brooks, MS**
HICAHS Admin Coordinator and Research Manager for lab work
Colorado State University
College of Veterinary Medicine & Biomedical Sciences
San Antonio Regional Campus
210-276-9011
David.Gimeno@uth.tmc.edu

Robert Hagevoort, PhD, MS
Consultant on the project, “Exposure Assessment and Intervention Analysis”
New Mexico State University
Extension Specialist
Dairydoc@nmsu.edu

Annie Keeney, PhD, MSW, PPS
Assistant for the Evaluation Program
San Diego State University Social Policy Institute and adjunct in the School of Social Work
619-594-2639
Annie.Keeney@colostate.edu

Peter Kines, PhD, MS
National Research Centre for the Working Environment, Denmark
+45 3916 5360
pki@nrewe.dk

Rebecca G. Lawver, PhD, MS
Co- Investigator of the project "Agricultural Safety Education Initiative"
Utah State University
435-797-1254
Rebecca.lawver@usu.edu

Luis Mendonca, DVM, MS
Kansas State University
125 Call Hall
Manhattan, KS
785-532-2652
mendonca@k-state.edu

Rhonda Miller, PhD, MS
Evaluator of the project "Agricultural Safety Education Initiative"
Utah State University Cooperative Extension
435-797-3772
Rhonda.miller@usu.edu
Jessina Morse  
Research Assistant and translator for various HICAHS Projects  
Colorado State University  
College of Veterinary Medicine & Biomedical Sciences  
1681 Campus Delivery  
Fort Collins, CO 80523-1681  
970-491-9050  
Jessy.Morse@colostate.edu

Michael Pate, PhD, MS  
Principal Investigator of the project "Agricultural Safety Education Initiative"  
Penn State University  
110 A Research Unit A  
Hastings Road  
University Park, PA 16802  
Formerly with Utah State University  
814-865-2808  
mlp79@psu.edu

Dustin K. Perry, PhD, MS  
Co-Investigator of the project "Agricultural Safety Education Initiative"  
Montana State University  
230 Linfield Hall

Kathy Petersen  
HICAHS Financial Manager  
Colorado State University  
1681 Campus Delivery  
Fort Collins, CO 80523-1681  
(970) 491-6097  
Kathy.Petersen@colostate.edu

Lisa Pompeii, RN, MS PhD, FAAOHN  
University of Texas School of Public Health  
San Antonio, TX 78229  
713-500-9474  
Lisa.Pompeii@uth.tmc.edu

Louise Quijano, PhD, LCSW  
HICAHS Director of Evaluation Program – Resigned 5/2017  
Colorado State University  
School of Social Work  
1586 Campus Delivery  
Fort Collins, CO 80523-1586
Stephen Reynolds, PhD, CIH, FAIHA
HICAHS Director
Emerging Issues Program Lead
Co-Investigator of the project
“Occupational Safety Management and Leadership on Large-Herd Dairy Farms”
Colorado State University
College of Veterinary Medicine & Biomedical Sciences
1681 Campus Delivery
Fort Collins, CO 80523-1681
(970) 491-3141
Stephen.Reynolds@colostate.edu

Noa Roman-Muñiz, DVM, MS
Colorado State University
1171 Campus Delivery
Fort Collins, CO 80523-1171
(970) 491-6022
Noa.Roman-Muniz@colostate.EDU

John Rosecrance, PhD, PT, CPE
Lead of the Community-Initiated Grants Program,
Investigator on "Enhancing Safety Training" and "Exposure Assessment" projects
Colorado State University
College of Veterinary Medicine & Biomedical Sciences
1681 Campus Delivery
Fort Collins, CO 80523-1681
(970) 491-1405
John.Rosecrance@colostate.edu

Joshua Schaeffer, PhD
Research Core Lead
Colorado State University
College of Veterinary Medicine & Biomedical Sciences
1681 Campus Delivery
Fort Collins, CO 80523-1681
(970) 491-6636
Joshua.Schaeffer@colostate.edu

Alyx Shultz, PhD
Evaluator of the project "Agricultural Safety Education Initiative"
Murray State University
270-809-6925
ashultz@murraystate.edu
This list does not include all research associates and consultants on HICAHS projects or the contact information of students. Students who are working on HICAHS projects include:

Leeroy Cienega, MPH Student at University of Texas School of Public Health in San Antonio,
Brian Kim, Graduate Student Researcher and PhD student at Colorado State University,
Taylor King, Student Outreach Staff and MPH student at Colorado State University,
Elise Lagerstrom, Graduate Student Researcher and PhD student at Colorado State University,
Anabel Rodriguez, MS, PhD Student at University of Texas School of Public Health in San Antonio,
Amanda Van Dyke, PhD Student at Colorado State University, and
Cortney Worrell, PhD Student at Colorado State University.
HICAHS Collaborators Directory

Bledar Bisha, DVM, PhD, MS
Collaborator, various projects
University of Wyoming
Department of Animal Science
(307) 766-3140
bbisha@uwyo.edu

Bill Brazile, PhD, CIH
HICAHS Consultant
Colorado State University
College of Veterinary Medicine & Biomedical Sciences
1681 Campus Delivery
Fort Collins, CO 80523-1681
(970) 491-4272
William.Brazile@colostate.edu

Gregory Dooley, PhD, MS
HICAHS Collaborator, Various Projects
Colorado State University
College of Veterinary Medicine & Biomedical Sciences

Sheryl Magzamen, PhD
Collaborator with Stephen Reynolds
Colorado State University
College of Veterinary Medicine & Biomedical Sciences
1681 Campus Delivery
Fort Collins, CO 80523-1681
970-491-5469
Sheryl.Magzamen@colostate.edu

Craig McConnel, DVM, PhD
2014 HICAHS Pilot Recipient, HICAHS Collaborator
Washington State University
cmcconel@vetmed.wsu.edu
HICAHS Board Members and Staff at the 2017 Board Meeting, Fort Collins, CO:
Front Row- Left to Right (A. Cassidy, P. Ayers, G. Whipple, O. Reuvezkamp, E. Brooks, H. Gibson, B. Kim)
2nd Row- Left to Right (E. Prisco, M. Bradford, J. Schaeffer, D. Knell, N. Roman-Muniz, J. Lemmel)
Not Pictured (E. Hendrikson)

Ragan Adams, DVM, PhD
Extension Coordinator
Colorado State University,
Dairy Extension Specialist
Colorado

Shawn Archibeque, PhD, MS
Assistant Professor
Colorado State University
Department of Animal Science
College of Agricultural Sciences
Colorado

Kevin Dole
Owner
Alpha Technology SA Corp
Florida

Robert Ellis, PhD
Professor
Colorado State University
Director of Biosafety
Department of Microbiology
College of Veterinary Medicine & Biomedical Sciences
Alvaro Garcia, PhD  
Assistant Professor  
South Dakota State University Extension  
Dairy Extension Specialist

Herb Gibson  
OSHA Representative  
US Department of Labor  
Colorado

Paul Gunderson, PhD  
Professor Emeritus  
North Dakota University System  
North Dakota

Robert Hagevoort, PhD  
New Mexico State University Extension Specialist  
New Mexico

Dan Hair, MSS, CSP  
Workers Compensation Fund  
Senior Vice President  
Chief Underwriting and Safety Officer  
Utah

Ed Hendrikson, PhD, PA-C  
SALUD Family Health Center  
Director of Environmental Health  
Colorado

David Knell  
Safety Consultant  
Pinnacol Assurance Insurance  
Colorado

Peter Kolb, PhD  
Associate Professor  
University of Montana Forestry Extension  
Montana

Jessica Lemmel  
Director of Communications  
Colorado Livestock Association  
Colorado

Matthew Nonnenmann, PhD, MS  
Assistant Professor  
Deputy Director Great Plains Center for Agricultural Health

University of Iowa  
School of Public Health  
Iowa

Emily Prisco  
Director of Farm Resources  
Aurora Organic Dairy  
Colorado

Olga Reuvekamp  
Owner  
Hilltop Dairy  
South Dakota

Brian Schiller  
Vice President, Agribusiness Department  
Flood and Peterson  
Colorado

J.W. Schroeder, PhD, MS  
Retired Professor  
North Dakota State University Extension Specialist  
North Dakota

Clyde Serna  
Pinnacol Assurance  
Colorado

Jon Slutsky  
Owner  
La Luna Dairy  
Colorado

Bruno Sobral, PhD, MS  
Director of the One Health Institute  
Colorado State University  
Colorado

Mike Taylor, MS  
Global Manager, Safety, Health, and Environment  
Risk Management Division  
The Church of Jesus Christ of Latter-day Saints  
Utah

Juan Velez, MV, MS, Dipl. ACT  
Vice President of Farm Operations  
Aurora Dairy  
Colorado
Glen Whipple, PhD  
Professor  
Director of Extension  
University of Wyoming  
Wyoming

Allen Young, PhD, MS  
Professor  
Dairy Extension Specialist  
Utah State University  
Utah