Colorado State University

Equine Institute

Livestock Medicine

Environmental Health Institute

Colorado State Veterinary Diagnostic Laboratory

College of Veterinary Medicine & Biomedical Sciences

Equine Institute

- ***Equine Science – Bachelor's Program***
- ***Equine Reproduction Laboratory***
- ***Orthopaedic Research Center***
- ***Veterinary Teaching Hospital***
- ***Equine Veterinary Hospital****
- ***Equine Education Center****
- ***Equine Therapeutic Riding Center****

****In 5 year strategic plan***

Livestock Medicine

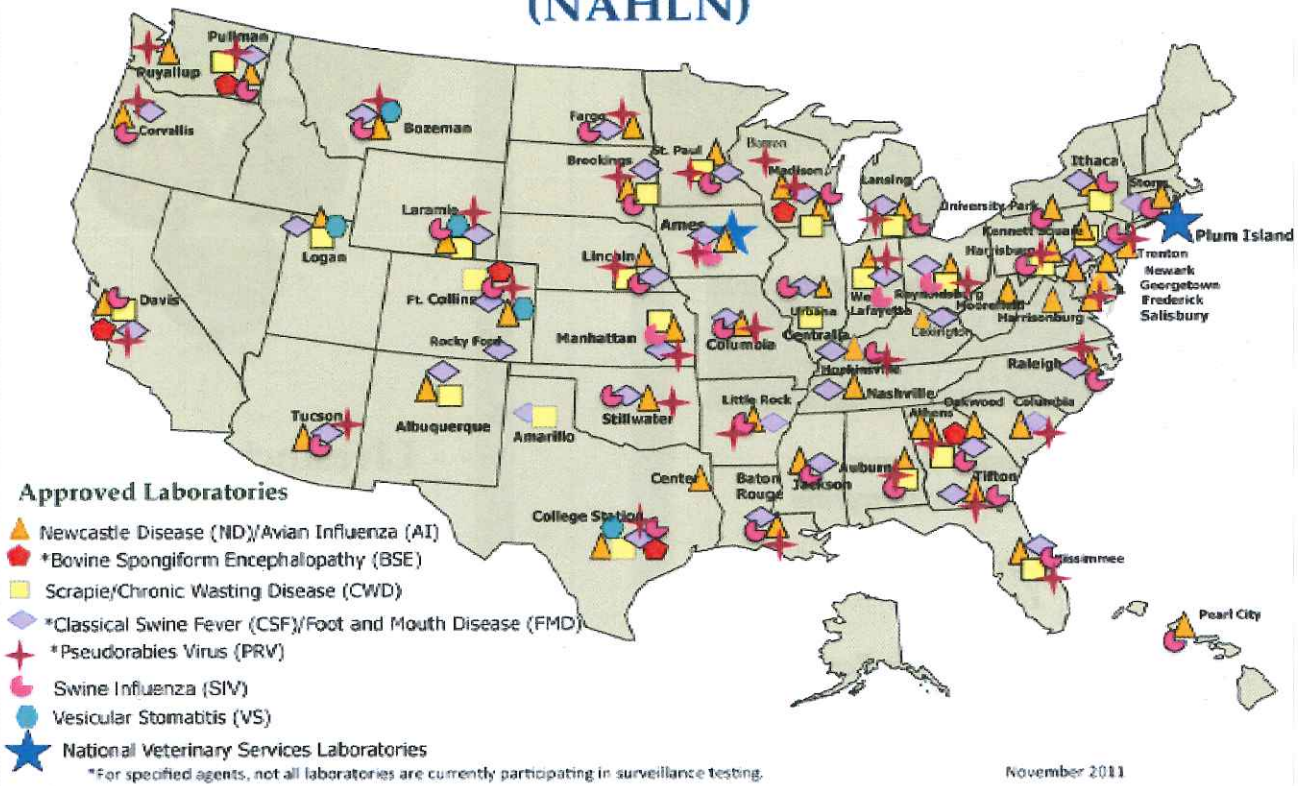
- **New Programs**
- **Serving rural areas**
- **Industry collaboration**

Environmental Health Institute

- **Agriculture**
- **Ecosystem Health**
- **Human Health**

Attachment F

National Animal Health Laboratory Network (NAHLN)



Three state animal labs:

- Fort Collins
- Rocky Ford
- Grand Junction

Primary Roles

- Public health
- Food safety
- Animal health
- Education, research & service

Fun Facts

- CDC & USDA
- Avian Influenza
- Anthrax
- Rabies
- BSE – Mad Cow Disease
- CWD

Colorado State University

COLLEGE OF AGRICULTURAL SCIENCES

Committed to 21st Century Solutions for Food Systems and the Environment

Assuring Meat and Produce Safety and Quality

The goal of this initiative is to assure that U.S. meat and produce are acceptable to domestic and international markets, by scientifically ensuring the superior quality and safety of animal and plant consumables. Our scientists in the College of Agricultural Sciences collaborate with colleagues across the university to conduct food safety and food quality research.

- Develop and evaluate techniques and biosensors for rapid detection of foodborne public health concerns
- Examine animal identification and traceability systems in livestock and meat products
- Enhance nutritional value of meat
- Develop science-based strategies to ensure exports of high quality, nutritious safe foods

Improving Food for Enhanced Human Health

The goal of the Crops for Health program is to reduce the burden of chronic diseases including obesity, diabetes, heart disease and cancer, using food as the vehicle of choice for delivering essential nutrients to the human population. Our research objectives are to understand disease-preventing properties of the plant metabolome and to maximize these properties through plant breeding and the marketing of healthier new crop cultivars.

- Prevent chronic diseases through food based dietary intervention
- Identify specific food crops that reduce the risk of chronic disease
- Identify disease-preventing qualities of major crops

Developing Profitable and Environmentally Sound Beef/Dairy Production Systems

The goal of this initiative is to utilize our resources and strengths in the College of Agricultural Sciences and across the university to produce and optimize sustainable beef and dairy systems that will address the global challenges of hunger and health. The systems being developed will address environmental concerns associated with beef and dairy production, especially those arising from the cattle carbon footprint and the resulting impact on climate change.

- Increase the efficiency and economic viability of beef and dairy production
- Address environmental issues associated with livestock production
- Continue to advance animal welfare
- Enhance global markets for U.S. beef and dairy products

Developing Land Use Systems for Sustainable Agriculture and Urban Environments

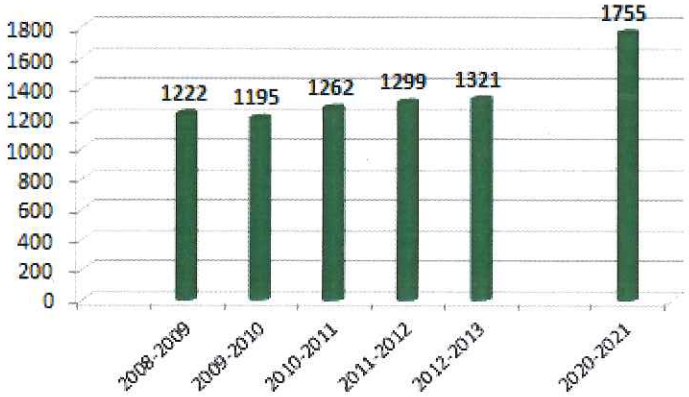
Managing land use at the rural-urban interface and capturing benefits while reducing costs is a central challenge for policymakers and stakeholders in Colorado. Land use choices must be guided by sustainability principles and attention to economic tradeoffs. Systems and policies concerning land use options will be developed and stakeholders will be engaged on all levels

- Inventory land use at the rural-urban interface
- Develop multiple options for best use of land resources based on potential benefits
- Formulated science based information that can be used by policy makers for land use decisions

Optimizing Agriculture's Water Footprint

A critical aspect of water management in Colorado is coping with the competing demands for available water. Colorado State University plays a significant role in teaching, research, and outreach related to management of our limited water resources. We are innovators in soil and crop management systems and urban landscape design, and thus are uniquely positioned to address the closely linked global challenges of hunger, health, and climate change issues.

- Develop profitable and environmentally sustainable cropping systems under water limited conditions
- Develop water efficient urban landscapes
- Apply technologies such as GIS to enhance cropping systems under water limited conditions
- Coordinate national and international workshops on water management



Percentage by department

(33% Non Resident students)

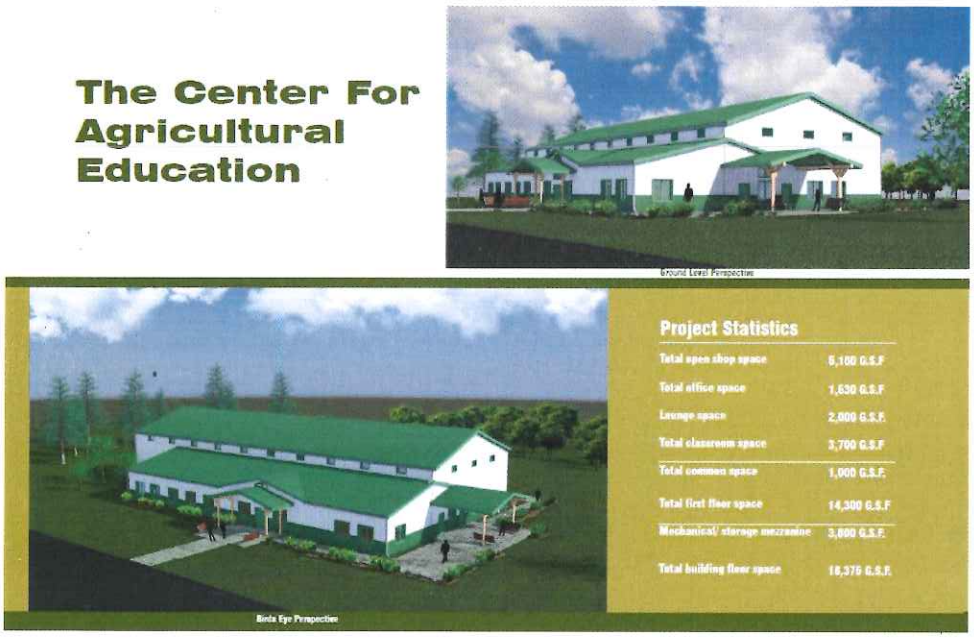
- An Sci 52%
- HLA 26%
- DARE 15%
- SCS 7%

Rate of increase since 2010: 42 students/year

Rate of increase until 2020: 54 students/year

Vision 2020

Animal Sciences Remodel



Center for Agricultural Education at ARDEC

Overview of CSU Agricultural Experiment Station

Mission

Conduct research supporting an agriculture that is economically viable, environmentally sustainable, and socially acceptable

AGRICULTURAL EXPERIMENT STATION

Colorado State University

AES Programs

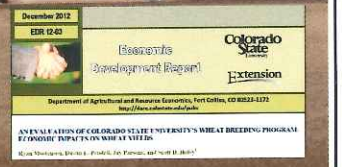
- Animal Production Systems
- Plant Production Systems
- Natural Resources and Environment
- Nutrition and Food Safety
- Community Resource Development

CSU Departments with AES Research

- Animal Sciences
- Horticulture & Landscape Architecture
- Bioagric. Sciences & Pest Management
- Soil & Crop Sciences
- Agric. & Resource Economics
- Forest, Rangeland, and Watershed Stewardship
- Civil & Environmental Engineering
- Atmospheric Sciences
- Food Science & Human Nutrition
- Health & Exercise Science
- Human Development & Family Studies
- Statistics
- Biology
- Biomedical Sciences
- History

Wheat Program

Period	Benefit	Cost	Benefit/Cost
2011	$61.5M	$3.22M	19:1
1974-2011	$19.8M	$2.8M	7:1

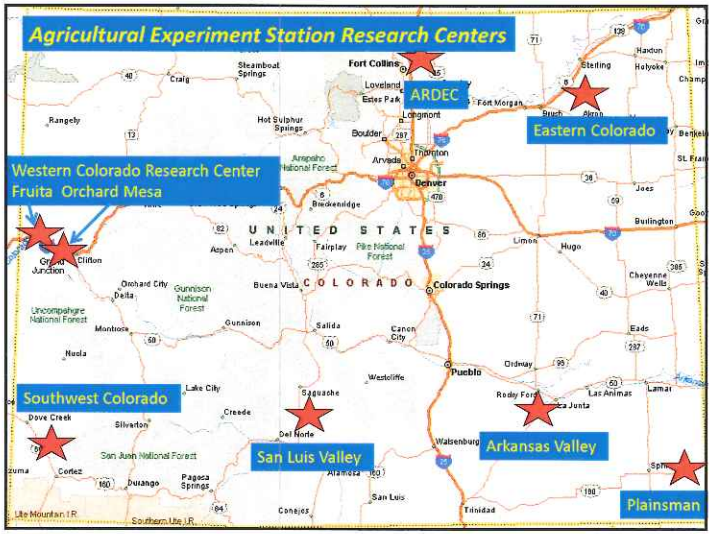


Program of Research and Scholarly Excellence

Center for Meat Safety and Quality

Economic benefit: Reduced food-borne illness and deaths, decreased recall of contaminated meat, increased meat exports

Program of Research and Scholarly Excellence



Colorado Climate Center
- COAgMet network of automated stations
- Weather data available to public via internet
- Compute ET
- Impact: irrigation, water resources, emergency planning, engineering and construction

Lysimeter at Arkansas Valley Research Center, Rocky Ford

- Lysimeter determines water use by crops
- Application of data to the region depends on robust weather station network

Collaboration with CWCB for long-term funding

Impact of Selected AES Research

Research Program	Annual Economic Impact, $M
Release of improved wheat varieties	20
Release of improved potato varieties	14
Adoption of more intense dryland cropping systems	22
Disease prevention and control in onions	5
Identification of biomarker for brisket disease in beef cattle	10
Decision support systems for livestock	7
Total annual impact	$76M

Total Colorado AES state funding: ~$12M

The Colorado State University

LYSIMETER PROJECT

MEASURING CROP WATER USE TO COMPLY WITH THE ARKANSAS RIVER COMPACT

The CSU Lysimeter Project, established in 2006 and expanded in 2009, is based at the Arkansas Valley Research Center in Rocky Ford, Colorado. The project uses two lysimeters and a network of weather stations to precisely measure the amount of water used to cultivate crops in Colorado's agriculturally important Arkansas River Valley. CSU researchers use data gathered with these instruments to improve scientific calculations and analysis of the amount of water used in regional crop production. This research-based information is critical to Colorado's ability to comply with the Arkansas River Compact, which directs the states of Colorado and Kansas in use of – and returns to – the Arkansas River.

Background

- The mathematical equation used as the standard to calculate crop consumptive water use, known as crop evapotranspiration, or Etc, was changed to the more accurate Penman-Monteith equation as a result of litigation between Kansas and Colorado over the Arkansas River Compact.
- The Penman-Monteith equation has not been tested in the Arkansas River basin, and requires a new set of crop coefficients to estimate ETc for crops grown in the basin. The CSU Lysimeter Project helps provide and test this information.
- Calculated ETc values are used in the Hydrological-Institutional Model (H-I Model) that is used to calculate the effects of well pumping and replacement water on usable stateline flows in the Arkansas River.

Project objectives

- Validate the American Society of Civil Engineers (ASCE) Penman-Monteith equation for calculating reference evapotranspiration (ETr) in the basin for use in Arkansas River Compact compliance.
- More accurately represent consumptive water use of major irrigated crops in the basin, by defining the crop coefficients (Kc) used to convert ETr to equivalent crop ET (ETc) values.

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How the lysimeters work

The CSU project at Rocky Ford maintains two lysimeters: The larger instrument is used for measuring crop Etc; a second, smaller lysimeter is used as a control and measures alfalfa as a reference.

A steel box containing undisturbed soil is set on a very sensitive underground weighing scale that continuously records the mass of the box.

The weighing scale detects all additions and subtractions of water in the lysimeter box. Crop ET_c is the main subtraction of water from the lysimeter, and is recorded continuously. Any irrigation, rainfall, or drainage is also detected by the weighing scale.

The lysimeter is managed the same way as the surrounding field with the goal of having crop growth in the lysimeter that is very similar to the surrounding field.

Project Benefits

- More accurate calculations of replacement water required for depletions from well pumping.
- ASCE Penman-Monteith equation validated for Arkansas Valley conditions.
- Better ET_r and K_c values for use in the H-I Model, allowing for compliance with the Arkansas River Compact.
- Accurate mapping of ET_c across the entire basin.
- Better crop coefficients for ET-based irrigation scheduling.
- Better ET_c calculations for future administration of water rights.