

FY 2003 Annual Report of Accomplishment and Results

Colorado State University Agricultural Experiment Station

A. Overview

CSU programs made significant progress this year in meeting the following goals.

USDA Goal 1: An Agricultural Production System that is Highly Competitive in the Global Economy

CSU Program 1: Plant and animal improvement and new agricultural development

Summary

In the area of plant genetic resource and biodiversity: In fall 2003, two experimental lines of wheat (CO980607 and CO00D007) were advanced for Foundation seed production to enable release as new cultivars in fall 2004. CO980607 and CO00D007 were the highest and second highest yielding entries in the 2003 Colorado Uniform Variety Performance Trials. The varieties reduce costs of production, minimize or eliminate the need for chemical pesticides, and improve marketing options.

CSU Program 2: Plant and animal production systems

Summary

In the area of genetic improvement of animals: An integrated beef production system was implemented that allows evaluation of the effects of management changes on the entire production system, including insemination. This production system allows evaluation of new animal identification systems that may be developed and implemented in the industry as a means of animal traceback. In addition the results of this program will provide producers with decision tools that will improve their profitability.

In the area of management of range resources: Fertilizer application best management practices were evaluated for use in mountain meadows. Results suggest that mountain meadow hay producers should apply fertilizer in the fall, especially P-based fertilizers, to improve hay yields, avoid economic losses from loss of applied fertilizers, and reduce the potential for impacts to water quality.

In the area of genetic improvement of animals: Expected Progeny Differences (EPD) measurements were developed for cow maintenance, resulting in the first EPDs that are simultaneously directly related to costs of production and easy for producers to value. These EPDs will help cow-calf producers both locally and nationally to select animals that will reduce their costs of production and thereby increase their profitability.

CSU Program 3: Safe and effective management of pests

Summary

In the area of diseases and nematodes affecting plants: New modes of action to help reduce triazine and ALS resistant weed populations in potato, dry bean, and onion crops are being investigated and saving farmers money. Sulfentrazone is now being successfully applied to potatoes and dry beans. Fluroxypyr is controlling volunteer potatoes in dry bulb onions, reducing competition with the crop and helping to prevent late blight inoculum.

In the area of diseases and nematodes affecting plants: Potato research has resulted in precision application of chemical treatments for powdery scab combined with cultivar resistance to powdery scab. In addition, this research has elucidated the biology of the root-knot nematode in the San Luis Valley. With this new information, precisely timed applications of Vydate can provide economical control of nematodes

USDA Goal 2 and Goal 3: A Safe and Secure Food and Fiber System and a Healthy, Well Nourished Population

CSU Program 4: Food Safety and Nutrition

Summary

In the area of protecting food from contamination: Some of the common decontamination methods include spraying or rinsing animal carcasses with acetic or lactic acid. Results of several experiments indicate that *Escherichia coli* O157 H7 has the ability to survive better in acetate-containing runoff fluids, which may be associated with its inherent ability to resist the toxicity of acetic acid by increasing its intracellular pH, as opposed to lactic acid.

In the area of new and improved food processing technologies: Outbreaks of salmonellosis have been associated with dried apples and other produce and with foods of low water activity such as beef jerky. Pre-treating apple slices with ascorbic acid, citric acid or sodium metabisulfite solutions may serve as effective pre-treatments to enhance destruction of *Salmonella* during home-type drying of apple slices as well as help retain the apple's light color during drying and storage.

USDA Goal 4. Greater Harmony between Agriculture and the Environment

CSU Program 5. Agriculture and environmental quality

Summary

In the area of watershed protection and management: Two agricultural canal systems (ACS), in use since the nineteenth century, were investigated for information about the benthic macroinvertebrate communities associated with them. Despite similar points of origin and length, the canals and the benthic macroinvertebrate life associated with them were very distinct, suggesting that each agricultural canal system be treated independently when developing water quality standards using

benthic macroinvertebrates as indicators. Additionally, this research clearly indicated that there is an increase in environmental stress as these ACS traverse urban zones.

In the area of waste disposal recycling and reuse: This study shows that long-term recycling of biosolids and water treatment residuals on dryland wheat, rangeland, and wildfire-burn areas is socially, environmentally, and economically sustainable. Results suggest that the application of biosolids after wildfires can provide quick establishment of vegetative cover to prevent soil erosion and will positively affect plant biomass and canopy cover for three years after application.

USDA Goal 5. Enhanced Economic Opportunity and Quality of Life for Americans

CSU Program 6. Rural and community development

Summary

In the area of community development: Eleven traditional non-monetary water exchanges in the Cache La Poudre River Basin in Colorado were studied using a statistical predictive model. The water exchanges were found to have played and to currently play an important role in reducing conflict over water supplies in the basin. Disruption of these exchanges resulting from urbanization and/or the increased attempts to allow open marketing of water in the basin may be expected to negatively affect irrigated agriculture.

B. Program specifics

CSU Program 1: Plant and animal improvement and new agricultural development

Key Themes: Plant Genetic Resource and Biodiversity

Short Description - In fall 2003, two experimental lines (CO980607 and CO00D007) were advanced for Foundation seed production to enable release as new cultivars in fall 2004. CO980607 (Yuma/T-57//TAM 200/3/4*Yuma/4/KS91H184/Vista pedigree) is a medium maturity, semidwarf, hard red winter wheat with good test weight, good shattering tolerance, moderate resistance to stripe rust, resistance to Russian wheat aphid (biotype A), and excellent overall milling and baking properties. CO980607 was the highest yielding entry in the 2003 Colorado Uniform Variety Performance Trials (UVPT) and is second only to the cultivar Trego on a three-year average. CO00D007 (Yumar//TXGH12588-120*4/FS2 pedigree) is non-transgenic herbicide tolerant ("Clearfield" wheat), medium-early maturity, tall semidwarf, hard red winter wheat with good shattering tolerance, resistance to Russian wheat aphid (biotype A), and excellent overall milling and baking properties. CO00D007 was the second highest yielding entry in the 2003 UVPT and is the highest yielding entry on a two-year average.

Impact - Development of improved wheat cultivars serves a vital function for the wheat industry in Colorado by reducing costs of wheat production, minimizing or eliminating the need for chemical pesticides, and providing improved wheat

marketing options. Since inception of the program in 1963, the CSU Wheat Breeding Program has released more than 20 improved wheat cultivars. CSU-bred wheat cultivars account for nearly 60% of Colorado's 2.6 million acres (2003 crop) with the remaining acreage planted almost exclusively with cultivars from university breeding programs in adjacent states. Estimates from Colorado wheat industry leaders indicate that quality enhancements from these wheat cultivars provide an average of \$20 million per year increased income for Colorado wheat producers (83 million bushels x \$0.25 per bushel price increase; 2003 dollars). CSU-bred Russian wheat aphid resistant cultivars are currently planted on over 25% of the Colorado acreage (2003 crop). Farmers who plant these cultivars and experience RWA infestations would save approximately \$14 per acre in insecticide costs (one application only) and \$22 per acre in reduced yield (average 25% yield reduction), a total benefit of over \$23 million per year.

Source of Federal Funds – Hatch Act Funds

Scope of Impact – State Specific

Key Themes: Genetic Improvement of Animals

Short Description - Through the integration of four research/teaching facilities, we have implemented a beef production system that includes a seedstock supplier, a multiplier, a commercial herd, and a feedlot. Germplasm in the form of semen and live animals have been moved down the system just as they would in the U.S. beef industry from seedstock to multiplier to commercial producer to feedlot. We have adopted a standardized performance recording system and are developing methods for tracking economic performance of each facility and on the system as a whole. This production system will allow us to evaluate the effects of individual research projects and management changes on the entire production system and is, we believe, a first for a university beef research program. In addition, a simulation model was developed that examines the economic impact of artificial insemination versus natural service when genetic differences exist between potential sires available for both of those mating methods. The model accounting for marketing at different stages of production such as at weaning, and at slaughter on both a live and grid system was parameterized with data from the Red Angus Association of America, one of the clients of the CSU Center for Genetic Evaluation of Livestock.

Impact - The mating simulation model will allow producers to evaluate the economic impact of implementing synchronization and artificial insemination programs, given their individual marketing plans. Although parameterized with Red Angus data, the simulation can be applied to any breed or composite. The integrated production system will allow evaluation of new animal identification systems that with the discovery of BSE will likely be developed and implemented in the industry as a means of animal traceback. Additionally we expect the results of this program to provide producers with decision tools that will improve their profitability.

Source of Federal Funds – Hatch Act Funds

Scope of Impact – State Specific

CSU Program 2: Plant and animal production systems.

Key Themes – Management of Range Resources

Short Description - Best management practices (BMPs) allow agricultural producers to balance economic and environmental needs in their operations. Fertilizer application BMPs need to be developed for mountain meadows. Fertilizer is typically applied to these meadows in April as producers prepare fields for the irrigation season that runs from early May to late July, but other options need to be investigated. The objective of this study was to determine how application timing of monoammonium phosphate (MAP, 11-52-0) fertilizer affected irrigation overland flow water quality. Application of 40 kg phosphorus (P) and 19 kg nitrogen (N) per hectare using MAP in the fall significantly reduced concentrations of reactive P and ammonium N in irrigation overland flow compared with early or late spring fertilization. Reactive P loading was 9 to almost 16 times greater when fertilizer was applied in the early or late spring, respectively, compared with in the fall. Ammonium N followed a similar trend with early spring loading more than 18 times greater and late spring loading more than 34 times greater than loads from fall fertilized plots. Losses of 45% of the applied P and more than 17% of the N were measured in runoff when fertilizer was applied in the late spring. These results, coupled with those from previous studies, suggest that mountain meadow hay producers should apply fertilizer in the fall, especially P-based fertilizers, to improve hay yields, avoid economic losses from loss of applied fertilizers, and reduce the potential for impacts to water quality.

Impact - Fertilization of mountain meadows with phosphorus and nitrogen fertilizers is a common practice to improve hay yields. Applying fertilizer in the late spring just prior to flood irrigation resulted in losses of 45% of the applied phosphorus and more than 17% of the nitrogen. Mountain meadow hay producers should consider applying fertilizer in the fall, especially phosphorus based fertilizers, to minimize losses of applied fertilizer thereby avoiding economic losses and reducing potential impacts to water quality.

Source of Federal Funds – Hatch Act funds

Scope of Impact – Multi - State

Key Themes – Genetic Improvement of Animals

Short Description - The number of Expected Progeny Differences (EPD) has increased from 5 to over 15 in the last 2 decades. The EPDs have become widely adopted by most breed associations and producer groups as a tool for making selection decisions that increase the rate of genetic improvement of beef cattle. Unfortunately, genetic progress does not necessarily lead to more profitable offspring and a more profitable beef production system as a whole. Much of this is a lack of methods for incorporating current EPDs, most of which are for indicator traits, and the costs and incomes of production. Indicator traits, while important, are measured because they are related to traits that directly influence costs and incomes of production, the economically relevant traits. If EPDs for economically relevant traits were readily available, producers could much more easily value selection decisions

and the influence of those decisions on overall profitability, change in economically relevant traits should transfer directly to changes in profitability, given optimal management. For the cow/calf producer, feed requirements associated with maintaining the beef cow account for upwards of 70 percent of the costs of production for these producers. Historically, there has been no EPD that represents the costs of feed for the producing cow other than measurements on the indicator trait, mature weight. We used data from the Red Angus Association of America, one of the clients of the Colorado State University Center for Genetic Evaluation to develop a cow maintenance requirement EPD. This EPD is based on the weaning weight, body condition score at weaning, and mature weight observations on the individual. These observations are used to calculate milk production and mature metabolic weight genetic potentials which are, in turn, used in the calculations of the cow maintenance requirement EPD. The new EPD is expressed as Mcal of energy for maintenance required per month. The EPD ranged from minus 15 to plus 26 Mcal. A sire with a maintenance energy EPD of plus 20 will on average, produce offspring that require an additional 20 Mcal of energy for maintenance per month than offspring of a sire with an EPD of 0. These new EPD were reviewed by a technical committee made up of producers and scientists with subsequent approval to move from the prototype stage to production, making them available to all producers in the Red Angus breed. As this work was part of the National Beef Cattle Evaluation Consortium, this technology is available to participating breed associations and producer groups.

Impact - This research has resulted in the first EPDs that are simultaneously directly related to costs of production and easy for producers to value. We anticipate, and have already received many requests for information on this technology and its implementation. These EPDs will help cow-calf producers both locally and nationally to select animals that will reduce their costs of production and thereby increase their profitability.

Source of Federal Funds – Hatch Act funds

Scope of Impact – Multi State

CSU Program 3: Safe and effective management of pests

Key Themes – Diseases and Nematodes Affecting Plants

Short Description - The current recommendation for herbicide resistant weed management is to rotate crops and herbicide modes of action. Until recently potato, dry bean and onion growers did not have many new modes of action to help reduce triazine and ALS resistant weed populations. Based on research results from this project potato, dry bean and onion growers will have new products with modes of action that were not available two or three years ago. Sulfentrazone now has a Section 3 label that includes applications to potatoes and dry beans. Field research results from this project have been used to support these new registrations. This project has also supported the Colorado onion industry by providing data necessary to support a Section 18 label request for fluroxypyr to control volunteer potatoes in dry bulb

onions. Volunteer potatoes are not only highly competitive with the onion crop, but can also serve as a source of late blight inoculum.

Impact - For potato growers the impact of this new product is not just a new mode of action for weed control but a saving of as much as \$14 per acre in weed control costs. This could save the potato industry in Colorado \$1.1 million per year. The impacts to the dry bean industry are also significant because this new product should improve late season nightshade control. For onion growers with significant volunteer potato problems conventional control methods resulted in yield losses of 20-40%. Incorporating fluroxypyr in a weed management program could reduce yield losses to as little as 8-10%.

Source of Federal Funds – Hatch Act Funds

Scope of Impact – State Specific

Key Themes – Diseases and nematodes affecting plants

Short Description - Disorders caused by fungi and nematodes are ranked by growers as central yield and quality-limiting factors for potato production in Colorado. Disease forecasting is utilized each season to predict the onset of early blight and late blight in order to optimize fungicide applications. A wide spectrum of 73 fungicide treatments for control of foliar and soil-borne pathogens of potato were evaluated in 2003. We have shown that powdery scab can be effectively controlled with a combination of fluazinam and mancozeb applied at planting. Cultivars tolerant to powdery scab have also been identified in our trials. Chemical treatments combined with cultivar resistance can suppress powdery scab to economically acceptable levels. Red and yellow potatoes account for about 10 percent of Colorado potato production, valued at some \$15,000,000. Without controls for powdery scab, production of red and yellow potatoes will soon not be possible. For the first time, biology of the root-knot nematode in the San Luis Valley is being elucidated. With this new information, precisely timed applications of Vydate can provide economical control of nematodes. As a result of our work close to 10 percent of the potato acreage in the San Luis Valley is now treated with Vydate, allowing high value land to remain in potato production.

Impact – For potato blights alone, more than 90 percent of the potato acreage in the San Luis Valley is currently treated with new classes of fungicides based on efficacy data and application recommendations from this project. Early blight is now managed by two or three fungicide applications per season compared to four or five applications in the past. Likewise, no unnecessary fungicides are applied to prevent late blight as a result of accurate disease potato blights alone, more than 90 percent of the potato acreage in the San Luis Valley is currently treated with new classes of fungicides based on efficacy data and application recommendations from this project. Early blight is now forecasting an inoculum exclusion. This precision use of fungicides on potato translates into a savings of \$123 to \$185/ha (\$50 to \$75 per acre). In 2003, 27,743 ha (68,500 acres) of potatoes were grown in the San Luis Valley.

Source of Federal Funds – Hatch Act funds

Scope of Impact – State Specific

USDA Goal 2 and Goal 3: A Safe and Secure Food and Fiber System and a Healthy, Well Nourished Population

CSU Program 4: Food Safety and Nutrition

Key Themes – Protect food from contamination

Short Description - Decontamination technologies are used extensively in the United States to reduce microbial contamination of meat. They include spraying or rinsing of animal carcasses with water, chemicals (e.g., acetic and lactic acid) or pressurized steam. Although effective in reducing contamination, these treatments may lead to alterations in the microbial ecology of the plant and the meat, potentially allowing growth of resistant surviving pathogens in the absence or limited presence of competitors. The results of several experiments indicated that *Escherichia coli* O157 H7 has the ability to survive better in acetate-containing runoff fluids, which may be associated with its inherent ability to resist the toxicity of acetic acid by increasing its intracellular pH, as opposed to lactic acid. Therefore, careful consideration should be given to the use of acetate-based interventions in meat packing plants because of their lowered effectiveness against *Escherichia coli* O157 H7 and their increased effectiveness against the natural competitive meat microflora. In addition, special attention should be focused on avoiding or minimizing the collection of decontamination runoff fluids on food contact equipment surfaces.

Impact – *Escherichia coli* O157 H7 is a pathogen of major concern because it affects children, while *Listeria monocytogenes* is estimated to cause approximately 2,500 cases of illness, 2,300 hospitalizations and 500 deaths in the United States annually, many of which are associated with miscarriages. Thus, there is a need for control of these pathogens in meat plant environments and products. For implementation of U.S. meat and poultry inspection regulations based on the Hazard Analysis Critical Control Point (HACCP) system and adherence to current regulatory requirements for pathogen reduction in foods, meat processing plants employ spraying of carcasses with organic acid solutions and/or hot or cold water as sequential interventions for meat decontamination. These interventions can significantly reduce contamination on meat carcass surfaces and assist meat plants to comply with regulatory criteria. However, it is not known whether such interventions may also result in unknown long-term risks. For example it is unknown whether acidic residues on equipment surfaces or on meat may lead to development of acid resistant and more virulent strains of bacteria. Thus, possible long-term consequences of meat decontamination interventions on the microbial ecology of plants and products and on properties of surviving pathogens should be evaluated.

Source of Federal Funds – Hatch Act funds

Scope of Impact – State Specific

Key Themes – New and Improved Food Processing Technologies

Short Description - The recent association of foodborne illness with dried foods has indicated a need for continued research in home food drying. Apple slices are often pre-treated with acid or metabisulfite solutions to retain color during dehydration. We conducted a study to determine if pre-treating inoculated Gala apple slices with acid or metabisulfite solutions altered survival of Salmonella during dehydration and storage. Results suggest that acid or sodium metabisulfite solutions may serve as effective pre-treatments to enhance destruction of Salmonella during home-type drying of apple slices.

Impact – Outbreaks of salmonellosis have been associated with apples and other produce and with foods of low water activity such as beef jerky. Pre-treating apple slices with ascorbic acid, citric acid or sodium metabisulfite solutions may serve as effective pre-treatments to enhance destruction of Salmonella during home-type drying of apple slices as well as help retain the apple's light color during drying and storage.

Source of Federal Funds – Hatch Act funds

Scope of Impact – State Specific

USDA Goal 4. Greater Harmony Between Agriculture and the Environment

CSU Program 5. Agriculture and environmental quality

Key Themes – Watershed Protection and Management

Short Description - During the late 19th century, agricultural canal systems (ACS) were developed in eastern Colorado for developing a stable agricultural economy. Many ACS now resemble natural streams in terms of having an associated riparian zone and year round aquatic fauna. There has been limited scientific research conducted, attributable to the fact that ACS are viewed as pipelines or conduits for water transfer rather than as natural habitats for variety of organisms. However, due to the unprecedented urban development occurring along the Front Range of Colorado, these ACS are subjected to novel anthropogenic impacts as these canals traverse landscape changing from agricultural to rural/urban. Both water shareholders and now adjacent residents are concerned with water quality issues. Current research was designed to study the colonization and community development processes associated with the benthic macroinvertebrate communities within two ACS located along the Front Range of Colorado during the irrigation season. The important result of this study was both canals were surprisingly unique in terms of the availability and quality of habitat considering that both are over 100 years old, originate from the same location, and are parallel to one another for most of their respective lengths. The hydrological regimes of both canals were unique. These flow regimes controlled the development and persistence of the benthic macroinvertebrate communities. Lower flows favored those taxa more typically associated with standing water habitats, whereas peak flows favored rheophilic species. Additionally, it was clear that the variation of flow interrupted the life cycles of most of the benthic macroinvertebrates.

The colonization processes in both canal systems seemed to follow the patterns that would generally be expected within a new aquatic system. Additionally, along the length of the canals, downstream communities were composed of more tolerant organisms than the upstream sites near the source, the rather pristine Cache la Poudre River. This strongly suggested a longitudinal increase in stress within these ACS.

Impact – From this research it is recommended that each agricultural canal systems be treated independently when developing water quality standards using benthic macroinvertebrates as indicators. Additionally, this research clearly indicated that there is an increase in environmental stress as these ACS traverse urban zones, and the potential causes of this pollution should be a topic of concern for shareholders and managers of these canal systems.

Source of Federal Funds – Hatch Act funds

Scope of Impact – State Specific

Key Themes – Waste Disposal Recycling and Reuse

Short Description – CSU researchers studied the sorption of selenate and selenite by water treatment residuals (WTR) with respect to pH. We found selenate sorption decreased with increasing pH, most likely due to increasing net negative charge on WTR. However, the selenite sorption increased with increasing pH, and may be due to the possible presence of calcium carbonate in WTR. In May 1997, we applied Denver Metro Wastewater District composted biosolids at rates of 0, 5, 10, 20, 40, and 80 Mg ha⁽⁻¹⁾ to a severely burned, previously forested site near Buffalo Creek, CO. Vegetation and soils data were collected for four years following treatment. Following treatment, total biomass of vegetation increased with increasing biosolids application and the percentage of bareground decreased. Higher rates of biosolids application were associated with increased concentrations of N, P, and Zn in tissue of the dominant plant species (*Elymus lanceolatus* [Scribn. & J.G. Sm] Gould ssp. *lanceolatus*) relative to controls. The highest biosolids application rate resulted in elevated C and N content of soils for only two years after application. In a greenhouse study using simulated buffer strips, we determined the efficacy of WTR to increase the removal of P in surface runoff. Modeling using OPUS2 indicated that about a 10 mm soil-cover thickness of WTR was needed to remove P in an overland-flow system. We found that ceasing biosolids application at six to nine times the recommended rate in a dryland-wheat fallow agroecosystem that the P and Zn plant-availability approaches the untreated control levels within three croppings.

Impact - Our studies show that long-term recycling of biosolids and water treatment residuals on dryland wheat, rangeland, and wildfire-burn areas is socially, environmentally, and economically sustainable. The wildfire-revegetation study results suggest that the application of biosolids can provide quick establishment of vegetative cover to prevent soil erosion and will affect plant biomass and canopy cover for three years after application. Scientifically, these results provide new information on recovery from biosolids overapplication and on the effects of WTR-biosolids application to shrub- or grassland on soil chemical characteristics.

Source of Federal Funds – Hatch Multistate

Scope of Impact – Multi-State Research

With States: AR, CO, CA, FL, GU, HI, IN, IA, KS, OK, PA, WA, WY

USDA Goal 5. Enhanced Economic Opportunity and Quality of Life for Americans

CSU Program 6. Rural and community development

Key Themes – Community Development

Short Description - This study evaluated eleven important traditional non-monetary water exchanges in the Cache La Poudre River Basin in Colorado, and analyzed their current role in agricultural water management in the basin. This study included an inventory of the parties to the exchanges, the amount of water exchanged historically, the type of exchange (river to river, reservoir to river, reservoir to reservoir) and the type of decree governing the exchanges. A statistical analysis of the exchanges using a predictive model was based on twenty-two years of data. It was found that the eleven water exchanges have played an important role in reducing conflict over water supplies in the basin, and the exchanges remain important to agricultural water suppliers in the basin. The disruption of these exchanges from urbanization and/or the increased attempts to allow open marketing of water in the basin may be expected to negatively effect irrigated agriculture due to agriculture's limited purchasing power.

Impact - Water exchanges are important not only to the not-for-profit agricultural water suppliers that practice them, but to the irrigators served by these same agricultural suppliers. It was determined that canal companies and irrigation districts represent some of our most successful organizations in agriculture based on non-profit action rather than purely through market principles. The study of these water exchanges suggest ways in which irrigated agriculture in the Rocky Mountain Region might be cushioned from very intense efforts to privatize water supplies and to allocate water predominately through market principles.

Source of Federal Funds – Hatch Act funds

Scope of Impact – State Specific

C. Stakeholder Input

The Colorado Agricultural Experiment Station (CAES) annually utilizes multiple means of obtaining stakeholder input on programs conducted and solicits input on changes in program direction. The CAES supports research in 22 departments on the Colorado State University campus as well as at 8 off-campus research centers. Programs at the research centers are administratively responsible to the Director of the CAES who coordinates these programs with one or more academic departments. This year due to significant budget cuts at the state level the CAES organized a series of eight meetings around the state to help identify priority programs and discuss with the stakeholders the impacts that the budget reductions would have. The meeting locations and dates are listed below.

- April 28, 2003, Walsh, CO, Plainsman Research Center
- April 28, 2003, Rocky Ford, CO, CSU Cooperative Extension Office, Otero County
- April 29, Monte Vista, CO, Colorado Potato Administrative Building
- April 29, Durango, CO, CSU Cooperative Extension Office, La Platta County
- April 30, Cortez, CO, Southwestern Colorado Research Center
- April 30, Grand Junction, CO, Western Colorado Research Center
- May 1, Gunnison, CO, Gunnison County Fairgrounds
- May 2, Akron, CO, Washington County Event Center
- May 12, Denver, CO, Colorado Green Industry
- May 13, Fort Collins, CO, Rocky Mountain Farmers Union
- May 14, Greeley, CO, Colorado Livestock Association
- May 30, Denver, CO, Colorado Agricultural Commission
- June 2, Denver, CO, Denver Agricultural and Livestock Club
- June 3, Denver, CO, Agricultural Council

Taking into consideration all the input from the stakeholder reductions in several program areas were implemented as well as the closure of one of our off-campus research centers (Mountain Meadow) and a significant downsizing of the program at the Southwest Colorado Research Center.

D. Program Review Process

All projects conducted by the CAES are subjected to a peer review process. Each College at Colorado State University has adopted a process for conducting a peer review on all CAES projects submitted for support by state and federal funds. Documentation is available upon request for the specific process adopted by each College and approved by the CAES Director.

E. Evaluation of the Success of Multi and Joint Activities

In the area of food safety joint activities are taking place. Some of the significant accomplishments of the research efforts were reported in this report. However the effective dissemination of the results of these activities is also an important component. The dissemination of the results is done through the use the SafeFood listserv and web page (<http://www.colostate.edu/orgs/safefood/index.html>) which provides an electronic system for sharing information and project results with professionals, producers, retailers and consumers. In addition, SafeFood News has been published quarterly since fall 1996 to provide up-to-date information on current topics to professionals, producers, retailers

and interested consumers. This year readers were surveyed to assess the usefulness of the newsletter. Of the 107 surveys returned (36% response rate), 99% said they found the newsletter useful and 69% said they read most of the articles. Updates on outbreaks, emerging pathogens and food safety issues were the most popular types of articles. While the majority of respondents (61%) preferred to continue receiving the newsletter by mail, 38% indicated a preference for receiving the newsletter electronically.

In the area of development of computer tools for water managers we have on-going activities in the Lower South Platte of Colorado where we have a joint project called the South Platte Mapping and Analysis Program. As part of this project a number of computer tools and data has been developed over the last few years. The tools and data are distributed through the web (<http://www.ids.colostate.edu/projects/splatte/>). This project has been a collaborative effort with the major water users in the basin. Due to the severe drought that Colorado has experienced in the last three years there has been a significant increase in the review of the use of water by wells in the basin. There are over 5,000 agricultural wells in the Lower South Platte Basin of Colorado and over 80% of these wells were administered last year using tools developed as part of this project.

F. Multistate Extension Activities

Colorado State University (CSU) has been part of W170 “Chemistry and bio-availability of water constituents in soils”. As part of this project CSU researchers have conducted studies that show that long-term recycling of biosolids and water treatment residuals on dryland wheat, rangeland, and wildfire-burn areas is socially, environmentally, and economically sustainable. The wildfire-revegetation study results suggest that the application of biosolids can provide quick establishment of vegetative cover to prevent soil erosion and will affect plant biomass and canopy cover for three years after application. Scientifically, these results provide new information on recovery from biosolids overapplication and on the effects of WTR-biosolids application to shrub- or grassland on soil chemical characteristics. Participant states included *AR, CA, FL, GU, HI, IN, IA, KS, OK, PA, WA, WY, in addition to Colorado.*

U.S. Department of Agriculture
Cooperative State Research, Education, and Extension Service
Supplement to the Annual Report of Accomplishments and Results
Integrated Research and Extension Activities
Five Year Fiscal Plan Summary

Institution Agricultural Experiment Station
 State Colorado

Check one: Multistate Extension Activities
 Integrated Activities (Hatch Act funds)
 Integrated Activities (Smith-Lever Act Funds)

Title of Planned Program/Activity	Actual Expenditures				
	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004
Plant and animal improvement and new agricultural development.	\$266,695	\$177,681	\$330,514	\$190,424	\$190,424
Plant and animal production systems	\$53,358	\$100,476	\$66,126	\$162,713	\$162,713
Safe and effective management of pests	\$68,759	\$95,173	\$85,213	\$72,190	\$72,190
Food Safety and Nutrition	\$88,657	\$65,911	\$109,872	\$128,882	\$128,882
Agriculture and environmental quality	\$46,625	\$76,823	\$57,782	\$131,378	\$131,378
Rural and community development	\$398	\$81,699	\$493	\$18,605	\$18,605
Total	\$524,492	\$597,763	\$650,000	\$704,192	\$704,192

Director

Date

Form CSREES-REPT (2/00)