FY 2001 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 animal production efficiency: A study was conducted to determine the effects of repetitive use of growth promoting implants on beef carcass quality and consumer ratings of beef palatability. The study found that the number of implants administered during the lifetime of steers significantly affected the percentage of consumers that were "satisfied" with the palatability of strip loin steaks.

In the area of plant breeding and gene expression technology: Three new potato cultivars were released this year and plant variety protections was granted on Norkotah 3 and 8. A new pinto bean cultivar "Grand Mesa" was developed that possesses resistance to rust, bean common mosaic virus, and common bacterial blight. It has a semi-upright architecture, resulting in a crop that is easier to cultivate, irrigate, and harvest.

In the area of new processing and food technologies: The use of video image analysis systems to officially augment the application of U.S. Yield Grades to beef carcasses was approved by the USDA Agricultural Marketing Service.

CSU Program 2: *Plant and animal production systems.*

Summary

In the area of ornamental/green agriculture, urban gardening: Over 1,100 varieties of annual flowers were grown and evaluated for adaptability to the High Plains environment. Over 450,000 of the 2001 Plant Select plants were tagged and sold in 2001.

In the area of cropping systems: An ongoing effort studying no-till and minimum till practices in dry land systems has concluded that 3 or 4 year rotations are superior to 2 year wheat-fallow systems; they increased annualized grain production by 70% and economic return by 25-40% compared to wheat-fallow. About 1,500,000 acres have been converted from wheat-fallow to wheat-summer crop-fallow due to this project's findings.

In the area of plant production efficiency: Based on the research results it was recommended that for dryland corn production seedrow applied zinc at 0.336 to 0.672

kg per ha be used. Also, it was recommended that no zinc fertilization by used for dryland grain sorghum production, since grain sorghum seldom responded to applied zinc.

CSU Program 3: *Safe and effective management of pests*

Summary

In the area of weed management: Data developed in one of our projects was used to move sulfentrazone and flumioxazin into the Interregional Research Project No. 4, commonly known as IR-4 process, which helps minor crop producers obtain tolerances and registrations for pest control products. Residue tolerances and subsequent Special Local Need registrations are anticipated in the next several years. This new mode of action will provide potato growers with a valuable tool for the management of herbicide resistant weeds.

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 nutrition and health: Based on data collected it was found that increasing dietary intakes of omega-3 fatty acids, at an amount achievable in human diets, can significantly reduce biomarkers of premature delivery. Reducing premature births will significantly improve infant health and reduce health care costs.

USDA Goal 4. Greater Harmony between Agriculture and the Environment

CSU Program 5. *Agriculture and environmental quality*

Summary

In the area of water and water quantity: A continuous flow method was developed for rapid determination of soil hydraulic properties (less than two days). This method is ideally suited for researchers evaluating fundamental problems in soil water flow.

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. It was determined that 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. 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.

B. Program specifics

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

Key Themes: Animal Production Efficiency

Short Description - Improving product quality and consumer demand are issues of primary concern for the beef cattle industry. Research conducted during the reporting period focused on identification of cattle management practices for improving quality of beef products. A study was conducted to determine the effects of repetitive use of growth promoting implants on beef carcass quality and consumer ratings of beef palatability. The number of implants administered during the lifetime of steers significantly affected marbling score, shear force of longissimus muscle samples, and the percentage of consumers who were "satisfied" with the palatability of strip loin steaks. Implanted steers produced carcasses with lower marbling scores and longissimus steaks with higher shear force values and lower consumer ratings for palatability than did steers in the non-implanted control group.

Impact - Results of this study suggest that administration of implants before feedlot entry results in only marginal effects on beef carcass quality. However, aggressive lifetime implant protocols, requiring four or five implants, may be detrimental to beef carcass quality. These findings emphasize the need for the development of lifetime implant protocols that enhance cattle performance without adversely affecting beef carcass quality.

Source of Federal Funds – Hatch Act funds

Scope of Impact – State Specific

Key Themes: Plant Production Efficiency, Plant Germsplasm, Plant Health

Short Description – The basic objective of the Colorado potato-breeding program is to develop new potato cultivars with increased yield, improved quality, resistance to diseases and pests, and tolerance to environmental stresses.

Impact – In Colorado, 7,260 acres (2,940 ha), or 56% of certified seed acreage was planted to cultivars and advanced selections developed by the Colorado State University potato research programs.

Plant Variety Protection was granted for Russet Norkotah selections 3 and 8.

It is estimated that the value of the 2001 fall potato crop in Colorado was increased by $11-12 million due to improved yield and quality associated with new potato cultivars and clonal selections of established cultivars.

Source of Federal Funds – Hatch Act funds

Scope of Impact – State Specific

Key Themes: Plant Production Efficiency

Short Description - The Dry Bean Research Program at Colorado State University participated in the annual evaluation of national and regional bean nurseries for yield, adaptation, and reaction to diseases. In addition to evaluation of bean cultivars, the breeding program develops commercial cultivars in the pinto and black bean market

classes for use in the western US and High Plains. Cultivars are developed that possess stable resistance to rust, common blight and root rot.

Impact - The breeding program released a new bean cultivar 'Grand Mesa' that possesses resistance to rust, bean common mosaic virus, common bacterial blight and has semi-upright architecture, resulting in a crop that is easier to cultivate, irrigate, and harvest.

Source of Federal Funds – Hatch Multistate

Scope of Impact – Multi-State Research

With States: CA, FL, GA, ID, MI, NE, NYC, ND, OR, PR, WA, WI

Key Themes: New processing and food technologies

Short Description – Results of beef carcass instrument grading research efforts led to approval by USDA Agricultural Marketing Service, of the use of video image analysis systems (the Computer Vision System; RMS Research Management Systems USA, Inc., Fort Collins, CO) to officially augment the application of U.S. Yield Grades to beef carcasses.

Impact - Beef graders, who on average grade 450 carcasses an hour, now have, for the first time, technology to assist them in determining yield.

Source of Federal Funds – Hatch Act funds

Scope of Impact – State Specific

CSU Program 2: *Plant and animal production systems.*

Key Themes – Ornamental/Green Agriculture, Urban Gardening

Short Description - Selection, introduction, and evaluation of landscape plant materials suitable for the High Plains. Over 1,100 varieties of annual flowers were grown and evaluated during the 2001 season and a performance report was published and sent to all cooperators and industry personnel.

Impact - As a result of these trials, New Guinea Impatiens and vegetatively propagated Verbena's have become a more important flower crop to the state. Seven plant species were recommended or introduced to the trade and public by Plant Select in 2001. Over 450,000 of the 2001 Plant Select plants were tagged or sold in 2001. Bedding plant growers and consumers throughout Colorado and the region look to Colorado State for evaluation of both seed and asexually propagated bedding plant varieties.

Source of Federal Funds – Hatch Act funds

Scope of Impact – State Specific

Key Themes – Plant Production Efficiency

Short Description - Soil test recommendations for Southeastern Colorado typically recommend banding zinc at 2.24 kg per ha to both dryland corn and grain sorghum.

To study zinc fertilization on dryland corn and grain sorghum, AES researchers applied zinc chelate at 0, 0.224, 0.448, 0.672, 0.896, and 1.12 kg per ha with the corn and grain sorghum seed at planting (seedrow applied) in a sandy loam soil. The soil test reported 0.1 ppm Zn level in our 0 to 0.2 m depth sample. The soil test recommendation for our 3760 kg per ha yield goal for corn and grain sorghum was 2.24 kg per ha of banded zinc. Corn yields increased with seedrow zinc up to 0.336 kg per ha (one-sixth the recommended rate). The 0.336 kg per ha Zn rate produced 627 kg per ha more grain than the treatment without applied zinc. Grain sorghum did not respond to applied zinc.

Impact – Based on the research results it was recommended that for dryland corn production seedrow applied zinc be applied at 0.336 to 0.672 kg per ha. Also, it was recommended that no zinc fertilization be used for dryland grain sorghum production, since grain sorghum seldom responded to applied zinc. For a zinc cost of less than $0.80 per ha, dryland corn growers may realize about $8.00 per ha net income gain from a low rate of seedrow zinc. Moreover, dryland grain sorghum producers may save about $0.80 per ha by not fertilizing with zinc. Finally, using low-rate seedrow applications of zinc to dryland corn and eliminating zinc fertilizers from dryland grain sorghum may reduce the amount of zinc, and its potential heavy metal contaminates, in the environment.

Source of Federal Funds – Hatch Act funds

Scope of Impact – State Specific

Key Themes – Plant Production Efficiency, Agricultural Profitability

Short Description - The working hypothesis for this project is that no-till and minimum till practices allow intensification of cropping system beyond the long-term standard system of wheat-fallow because no-till improves capture and retention of the incident precipitation. After12 years of research, it has been concluded that cropping systems with 3- and 4-year rotations are superior to 2-year wheat-fallow systems; with increased annualized grain production by 70% and economic return by 25-40% compared to wheat-fallow.

Impact - There has been a conversion of about 1,500,000 acres in CO from wheat-fallow to wheat-summer crop-fallow. This has resulted in an increase in net return of about $18,750,000 per year (based on an increased return of $12.50/acre as indicated by economic analysis). The net effect on the environment is positive because the new systems provide greater amounts of year-round cover that reduce soil erosion by 80 to 99%, which in turn improves both air and surface water quality.

Source of Federal Funds – Hatch Act funds

Scope of Impact – State Specific

CSU Program 3: *Safe and effective management of pests*

Key Themes – Invasive Species

Short Description - Soil applied herbicides represent the mainstay of potato weed management. Yield and quality losses from weed competition force potato growers to aggressively control weeds in order to produce profitable yields. Research efforts have focused on identifying newer herbicides that will provide different modes of action for control of herbicide resistant weeds and potentially have a lower risk for movement to ground water. Sulfentrazone and flumioxazin are newer herbicides that inhibit an enzyme involved in the early stages of chlorophyll production. These herbicides control a number of weed species important in potato production. Various nightshade species are very susceptible to these herbicides at low rates. Field research suggests that when applied as pre-emergence treatments there is sufficient crop safety for use in potatoes and that most commonly grown varieties are tolerant. Broadleaf weed control has been excellent over a number of years, across environments, soil types and irrigation systems.

Impact **-** Data from this research was used to move sulfentrazone and flumioxazin into the IR-4 process, which helps minor crop producers obtain tolerances and registrations for pest control products. IR-4 is referred to as the "minor use" program. It is a government and university sponsored program to develop the data necessary for submitting minor crop pest control options to the Environmental Protection Agency (EPA) for approval.

Residue tolerances and subsequent Special Local Need registrations are anticipated in the next several years. This new mode of action will provide potato growers with a valuable tool for the management of herbicide resistant weeds.

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 – Nutrition and Health

Short Description – Long chain n-6 and n-3 fatty acids play important roles in labor and delivery. These effects may be mediated by prostaglandin (PG) synthesis and by regulation of matrix metalloproteinases (MMPs), both of which play roles in uterine contraction, cervical ripening and rupture of fetal membranes. The effects of altering dietary n6:n3 long chain fatty acid ratios, and the addition of dietary of CLA and docosahexaenoic acid (DHA) on fatty acid composition of reproductive tissues, PG synthesis in liver and reproductive tissue and serum MMP levels were examined in pregnant rats. Modified AIN-96G diets with n6:n3 ratios of 7:1 and 34:1 with and without added 1.1% (by weight) conjugated linoleic acid (CLA) and/or 0.3% (by weight) DHA were fed through day 20 of gestation. Reproductive tissues readily incorporated both DHA and CLA. CLA significantly ($p < 0.05$) depressed PGF2alpha

synthesis in placenta, uterus and liver by 50% when the n6:n3 ratio was 7:1 and by 66% at 34:1 ratio. Significant differences ($p < 0.05$) in PGE2 synthesis in uterus and liver were seen only between groups fed the high ratio of n6:n3 without CLA, and the low ratio with CLA. Addition of CLA to DHA containing diets depressed PGF2alpha by one-third in uterus and liver ($p < .05$). Serum MMP-9 and active MMP-2 were suppressed ($p<0.05$) by addition of either CLA or DHA.

Impact – Increasing dietary intakes of omega-3 fatty acids, at an amount achievable in human diets, can significantly reduce biomarkers of premature delivery. Reducing premature births will significantly improve infant health and reduce health care costs.

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 – Water Quantity

Short Description - Soil hydraulic properties are important in many soil processes but the measurement of these properties is usually tedious and often difficult. At Colorado State University, work continues on testing and applying a continuous flow method for rapid and accurate measurement of soil hydraulic conductivity (K(h)) and moisture retention ((h)) functions including hysteresis. The method employs simultaneous tensiometry, air pressure, and water flow measurements which are easily automated. The analysis uses a combination of direct Darcian analysis and numerical inversion of Richards' Equation for estimation of the hydraulic properties. If supplemented with the 1.5 MPa water content, this approach allows for estimation of wetting and/or draining K(h) and (h) over the entire pressure range of plant available water while retaining the physical significance of the hydraulic parameter estimates. Since this continuous flow technique does not employ equilibrium steps, it is uncommonly rapid. Complete characterization of (h) and K(h) over the tensiometer range of soil water potentials, including wetting and/or draining curves, can usually be accomplished in two days or less.

Impact - The continuous flow method is ideally suited for researchers evaluating fundamental problems in soil water flow such as temporal variation and spatial scaling/averaging of soil hydraulic properties. For example, changes in soil hydraulic properties as a soil reconsolidates following a disturbance are easily elucidated. This information could be used in management models where temporal effects in hydraulic properties are included. Other applications include water quality (e.g. salinity) effects on hydraulic properties and the impact of microbial processes on soil water flow.

Source of Federal Funds – Hatch Act funds

Scope of Impact – State Specific

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 10 off-campus research centers. Programs at the research centers are administratively responsible to the Director of the CAES and coordinate their programs with one or more academic departments. This year, each of the off-campus research centers held a public meeting where research results were presented and proposed programs were discussed. Additionally, research and outreach advisory committees at each research center reviewed ongoing and proposed research and made recommendations on long term research direction and goals. At the Western Colorado Research Center, two new program directions (sustainable fruit and vegetable production and container grown ornamentals) are being implemented. Public input was solicited on all proposed programs.

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

The CAES conducts a number of activities in coordination with CSU Cooperative Extension (CSUCE). Some of these activities are related to animal agriculture (soil and water contamination, manure management), water quality issues (salinity, non-point source pollution) and food safety and human nutrition. The activities that we want to highlight in this year's report are those related to food safety and human nutrition. In the past, the CAES and CSUCE have conducted listening sessions around the state to solicit research priorities and program needs. Last year CSU used a more formal process for the listening sessions to the CAES of the Plan for Agriculture are included in this year's POW update. The evaluation of the relevance and success of the food safety and human nutrition joint activities is show below.

Agriculture, in its broadest sense, is a food producing industry. Every effort must be made to ensure a healthy and safe food supply for the nation and the world. Therefore, producing and maintaining a healthy and safe food supply is of strategic importance. Stakeholder input as part of the Plan for Agriculture and in previous listening sessions has identified the need for healthy, high quality food (Issue IV in CSU Plan for Agriculture).

The work conducted in the food safety has led to numerous collaborations with other scientists, extension specialists and agents, and agency personnel in Colorado and other states. One example is the task force put together with representatives from Colorado and other states. One example is the task force put together with representatives from state and local health departments, cooperative extension and farmer's market association to develop guidelines for preparing and offering food samples to consumers at farmer's markets. A multi-state activity involved work with Extension specialists in Wyoming and Montana to develop a food safety training program for food service workers. Currently, work is ongoing with Extension specialists in Washington and Ohio to develop food safety education programs for persons at high risk of food borne illness and their health care providers.

Program activities in food safety have also resulted in a number of training materials including three extension fact sheets, five posters at Colorado CE annual forum/inservices, eight inservice training sessions or updates to extension agents, three training sessions around the state on food safety for farmers' market growers and vendors. A listserv has been created and is regularly used to provide information to extension agents, health department officials and other interested professions in

Colorado. In addition, SafeFood News, a quarterly newsletter (www.colostate.edu/Org/safefood) is published and goes out to more than 200 professionals in Colorado and neighboring states.

Over that past 3 years, 16 graduates students, 5 post-docs and numerous undergraduate students have worked on studies directly funded in the area of food safety. During this time, 78 abstracts or papers have been presented at professional meeting, 46 manuscripts in scientific journals have been published, 44 articles in more popular literature (e.g., conference proceedings, bulletins, fact sheets) have been published, and 50 articles as research reports have been published. In addition, 33 invited presentations have been delivered to professional, grower, and consumer groups.

F. Multistate Extension Activities

The Dry Bean Research Program at Colorado State University participated in the annual evaluation of national and regional bean nurseries for yield, adaptation, and reaction to diseases. In addition to evaluation of bean cultivars, the breeding program develops commercial cultivars in the pinto and black bean market classes for use in the western US and High Plains. Cultivars are developed that possess stable resistance to rust, common blight and root rot. The breeding program released a new bean cultivar 'Grand Mesa' that possesses resistance to rust, bean common mosaic virus, common bacterial blight and has semi-upright architecture which is easier to cultivate, irrigate, and harvest. Participant states included *CA, FL, GA, ID, MI, NE, NYC, ND, OR, PR, WA, WI, in addition to Colorado.*

PLAN FOR AGRICULTURE AT COLORADO STATE UNIVERSITY 2002-2007

I. AGRICULTURAL ISSUES WITHIN COLORADO AND ITS AGRICULTURAL COMMUNITY

ISSUE I: ASSURING PROFITABLE AGRICULTURE

The major limiting factor to the sustainability of agriculture is the ability of individual producers to derive a profit from their labors and investments. Profitability involves not only production of a high quality product but also controlling inputs, integrating resources, and marketing of the products produced.

STRATEGY I - Increase delivery of marketing, forecasting, and cost analysis information that enhances profitability.

Actions

1. Conduct annual Forecasting/Risk Management workshops at strategic locations within Colorado. (CAS, CE, WCIRM)
2. A regularly prepared/presented newsletter will be made available to address in a timely manner the Forecasting/Risk Management issues facing Colorado Agriculture.
3. Investigate alternative uses of traditional crops and resources. (AES)
4. Continue to investigate niche markets and specialty crops including organic farming. (CAS, CE, AES)
5. Continue to evaluate the costs of production as essential to improving profitability. (CAS, CE, AES)
6. Conduct regular statewide stakeholder meetings to stay abreast of issues facing agriculture. (CAS, AES, CE, WCIRM)

STRATEGY II - Deliver data responsive to mission of sustaining profitability.

Actions

1. Begin to require, where appropriate, economic impact of research findings and recommendations made, particularly by AES-supported projects. (AES)
2. Require all CE specialists and AES funded faculty to work with stakeholder committees to ensure that research and program delivery are timely and on target. (CE, AES)

3. Increase the analysis and understanding of the global agricultural economy and its effect on local markets, including workshops that convey this information to producers. (CAS, CE, AES)
4. Continue to support profitable agriculture by enhancing a systems approach to management and continue to examine the use of allied marketing efforts to increase profits. This will be especially important for enhancing the ability of small and medium-sized farms to continue to exist. (CAS, CE, AES)
5. Place a greater importance on the distribution to all segments of agriculture marketing insights and data that will help producers form marketing alliances and other marketing innovations. (CAS, CE, AES)

STRATEGY III - Integration of agricultural and natural resources will help to ensure profitability of agriculture as a multi-dimensional industry.

Actions

1. Continue to strongly support the concept of the Western Center for Integrated Resource Management. (CAS, CE, AES, CNR, CVMBS, WCIRM)
2. Support CSU's involvement in the national integrated program entitled The Conservation Technology Information Center. (CAS, CE, AES)
3. Continue to support and enhance "precision agriculture," research and outreach. The use of this expertise will be focused on its ability to enhance profitability and conservation of resources. (CAS, AES, CE, USDA-ARS, C of ENG)
4. Aggressively build stronger alliances with other colleges within the University and integrate expertise from these colleges to assist with agricultural issues. (CAS, AES, CE)

ISSUE II: ANIMAL AGRICULTURE AND THE ENVIRONMENT

Livestock sales provide approximately 70% of the farm gate receipts of the state. The livestock industry component of Colorado agriculture will continue to be strongly supported by agriculture programs at Colorado State University. The Colorado livestock industry is highly dependent upon confined feeding operations to ensure continued production of food and fiber. The industry is being affected by increased state and federal regulations within many of its components.

Concerns include:

- Soil and water contamination
- Air pollution – dust/odor
- Animal welfare
- Disposal of dead animals

STRATEGY - Provide research and outreach program that addresses the viability of animal agriculture in Colorado.

Actions

1. Investigate the possibility of forming a consortium with WTAM, TTU, NMSU, KSU, UN, and USDA to combine research and outreach efforts to address the issues of confined animal management. (CAS, AES, CE)
2. Examine alternative management practices for animal/animal product production, including consideration of economics as well as animal well-being issues. (CAS, AES)
3. Examine options for dead animal disposal, i.e., composting, base digestion, etc. (CAS, AES, CE, CVMBS)

ISSUE III: IMPACT OF INCREASED AGRICULTURAL REGULATIONS, LAWS AND INITIATIVES

Agriculture and its many components are facing being governed by an increasing number of regulations, laws and initiatives. It is difficult for producers to stay abreast of the changes being implemented and/or proposed. Thus, there is a need for greater education related to these changes.

STRATEGY I - Assist clientele on agricultural enterprises to understand the impact of regulations, laws and guidelines.

Action

1. Conduct statewide workshops explaining and examining the existing regulations and their impact on the industry. (CAS, CE)
2. Facilitate discussions between regulatory agencies and agriculture. (CE, CAS, CNR, CVMBS, WCIRM)

STRATEGY II - Supply research-based information to aid in decision making processes and provide a platform for policy discussions.

Action

1. Strongly support the continued development of the Colorado Policy Institute. (CE, AES, CAS, CNR, CLA, CAHS, VPRIT, PROVOST, etc.)
2. Include the Colorado Department of Agriculture and other agencies where appropriate in policy discussions. (CE, AES, CAS, CNR, CLA, CAHS, VPRIT, PROVOST, etc.)

ISSUE IV: HEALTHY, HIGH QUALITY FOOD

Agriculture, in its broadest sense, is a food producing industry. Every effort must be made to ensure a healthy and safe food supply for the nation and the world.

STRATEGY I - Coordination of food production, processing, and health and safety issues is important to agriculture's future.

Actions

1. Foster collaborative efforts on campus among the Departments of Food Science and Human Nutrition, Animal Sciences, Horticulture and Landscape Architecture, and Soil and Crop Sciences to establish a University Studies Program in Food Safety. (CAS, CAHS)
2. Actively recruit scientists capable of forming collaborative relationships. (CAS, AES, CAHS)
3. Continue to support the Center for Red Meat Safety-Department of Animal Sciences in its pursuit of excellence in enhancing the production of safe and healthy meat products. This effort will be closely linked with the issue of profitability; thus, this area may investigate the possibility of increasing its input into marketing of products, packaging and preparation. (CAS, CAHS, CE, AES)

STRATEGY II - Healthy, high quality food is a joint responsibility of agriculture that extends to producers and the consumers who purchase, prepare and consume agricultural products. Thus, educating consumers is an important part of ensuring safe, healthy food.

Actions

1. Enhance existing consumer education efforts by Cooperative Extension. (CE)
2. Continue to investigate packaging, preparation and storage processes that will enhance food safety. (CAS, CAHS, AES)
3. Immediately develop a plan to inform the public concerning bio-security issues and disease outbreaks that potentially affect agriculture and/or consumers. (CAS, CVMBS, CAHS, AES, CE)

ISSUE VI: THE UTILIZATION, PRESERVATION AND QUALITY OF WATER IS, HAS BEEN AND WILL REMAIN THE LIMITING FACTOR FOR OPTIMUM AGRICULTURAL PRODUCTION IN THE STATES

STRATEGY - Support the Colorado Water Center.

Action

1. Form new partnerships and enhance existing partnerships across the University to keep water issues at the forefront of CSU's agricultural programs. (CAS, AES, CE)
2. Support the implementation of the Strategic Plan for Water Outreach and Research, 2000-2015. See Attachment I. (CAS, AES, CE, CNR, VPRIT, C of ENG)

ISSUE VII: INCREASING INTERACTION BETWEEN TRADITIONAL SUSTAINABLE AGRICULTURE AND THOSE WHO SEEK TO ENSURE THAT AGRICULTURE IS A STEWARD OF THE STATE'S ENVIRONMENTAL RESOURCES

There is a need for broad-based, objective research that will facilitate open-minded discussion of issues. These discussions will necessitate the need for extensive external involvement that will not only help to identify the issues for discussion and research but will also serve as a source for external leadership, sponsorship and guidance of issue based discussions.

At present, Colorado and the West are focal points for debates revolving around agriculture and:

- Technically sound and environmentally friendly practices
- Clean air and water
- Utilization of public lands
- Preservation of open space
- Growth
- Conservation of wildlife habitats
- Conservation of natural resources

There is also a critical need to ensure the viability of Colorado's rural communities.

STRATEGY - CSU will facilitate land-use discussions with sound, research-based information that will provide insightful data to aid in decision making.

Actions

1. The CAS and CNR will form partnerships where appropriate to address issues of importance to constituents of both Colleges. These partnerships will be formed not only to enhance discussion but also to ensure the mitigation of political risks as well as the appearance of a biased discussion.

2. Support the CPI's effort to offer information for informed decision making. (CPI)
3. The WCIRM and CPI are, and will continue to be, bridges between colleges when issues needing the combined expertise of CAS, CNR, CVMBS, AHS or CLA are addressed. (CPI, WCIRM)

ISSUE VIII WITH THE INCREASED POPULATION GROWTH IN COLORADO AND ITS EXISTING BOUNTY OF NATURAL RESOURCES, THERE IS AN INCREASE IN "QUALITY OF LIFE AGRICULTURE" (QLA)

"Quality of Life Agriculture" includes:

- The Green Industry
- Equine pursuits
- Outdoor recreation
- Small acreages

STRATEGY - CSU is, and must remain, active and at the forefront of assisting and working with "QLA".

Actions

1. Maintain CSU's present status as a leader in green infrastructure issues: (CAS, CE, AES)
    - Turf Management
    - Ornamental Horticulture
    - Landscape Design and Architecture
    - Landscape Architecture and Planning
1. Delivery of management practices to small acreage owners with horses will be enhanced through increased outreach activity. (CE, CAS, CVMBS)
2. Promote awareness of and improvements to Colorado's green infrastructure, i.e., open space, parks and working lands of conservation value. This discussion of necessity will involve input from state and federal agencies dealing with wildlife, natural resources and parks, and recreational issues. (CAS, CNR, CE)

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
_X_ Integrated Activities (Hatch Act funds)
____ Integrated Activities (Smith-Lever Act Funds)

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

_____ _____
Director **Date**

Form CSREES-REPT (2/00)