

2010 Colorado State University Combined Research and Extension Annual Report of Accomplishments and Results

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I. Report Overview

1. Executive Summary

The Agricultural Experiment Station (AES) and Extension at Colorado State University are committed to excellence in basic and applied research and translation of this research through Extension programs to crop (including ornamental) and animal (including equine) agriculture. Extension continues to emphasize non-formal education and transfer of knowledge to audiences throughout the state, based on research information from the AES, the colleges of Agricultural Sciences, Applied Human Sciences, Engineering, Veterinary Medicine and Natural Resources. Programs emphasize best management practices in addressing issues that affect Coloradans. Five headings are used to organize this summary for Colorado programs:

- Program Goals
- Extension, AES, or Integrated
- New Programs, and/or Addressing NIFA Priorities
- Ongoing, Consistent, and/or Successful Programs
- Cross-cutting or Cross-disciplinary Initiatives.

4-H Youth Development

Program Goals: 4-H affects positive change in life skills (including leadership, citizenship, decision making, and communication) and in science, technology, engineering and math (STEM) -- including interest, knowledge, and application of science process skills -- for youth ages 5 to 18.

Extension, AES, or Integrated: Extension

New Programs, and/or Addressing NIFA Priorities: STEM priority benefits from available and developing content and resource support from National 4-H Headquarters, Colorado State University, Extension, and county partners.

Ongoing, Consistent, and/or Successful Programs: Colorado State University Extension reaches Colorado's K-12 youth through 4-H youth development programs in 4-H clubs, after-school and school enrichment. Development of volunteers who provide much of the leadership for 4-H, and private fund raising are associated activities. 4-H Youth Development emphasizes personal growth of young people through experiential learning with well-designed curricula and projects.

Cross-cutting or Cross-disciplinary Initiatives: Most 4-H Youth Development programs, while focusing on youth development, are built around content that may be supported by one or more college-based specialists.

Strong Families, Healthy Homes

Program Goals: Family Economic Stability programs affect positive change in participants' financial knowledge and skills, contributing to their ability to avoid bankruptcy, economic crisis, loss of jobs, and other money-related difficulties. AgrAbility programs help farmers avoid accidents and reduce the incidence of serious injury and disability.

Extension, AES, or Integrated: Extension

New Programs, and/or Addressing NIFA Priorities: DollarWorks2

Ongoing, Consistent, and/or Successful Programs: Family and Consumer Science (FCS) programs are experiencing change, driven by a need to focus expertise and programs that are available to meet the needs of Coloradoans. CSU Extension programs now seek to provide applied research and Extension education in a coordinated set of programs related to nutrition and health, food safety, and family economic stability. Financial stability of families is the area of focus for non-nutrition FCS programming. Colorado families' financial instability includes increasing rates of bankruptcy, economic crises and loss of jobs. Working in partnership with state and nongovernmental agencies, agents deliver DollarWorks2 and other curricula relevant to individuals and families in difficult economic times. A content specialist started January 3, 2011, to support this work. Work teams in parenting and healthy homes have been suspended in order to keep attention on the three determined focus areas for programming. AgrAbility programming continues.

Cross-cutting or Cross-disciplinary Initiatives: Consumer economics is a vehicle that can assist 4-H in reaching STEM targets.

Nutrition and Food Safety

Program Goals: Reduced incidence of chronic diseases (such as diabetes, heart disease, obesity and cancer), thus reducing health insurance premiums and mortality rates, and increasing employee productivity. Food Safety programs will reduce the economic burden and human suffering that can be caused by food-borne illness in the US.

Extension, AES, or Integrated: Integrated

New Programs, and/or Addressing NIFA Priorities: The Health Promotions and Disease Prevention Work Team provides research-based nutrition and health education to a variety of audiences across Colorado in an effort to promote healthful nutrition, activity and lifestyle behaviors. Food Safety is now structured as a stand-alone Extension Work Team in order to more fully address the NIFA priority. Food Safety research and education may be integrated into other Work Teams so that they are not limited to program delivery by FCS agents, but rather viewed as integral in many aspects of AES and Extension outreach.

Ongoing, Consistent, and/or Successful Programs: These work teams participated in the FCS focusing activity in June, 2009, and have specific outcome targets and indicators by which they collect their statewide data. Food Safety indicators, including effective hand washing, safe food preservation, and proper food temperature, are addressed through these activities:

- Food safety training for food service managers and employees;
- Food safety education for high risk audiences, their caregivers, and health care professionals;
- Food safety information for consumers including Farmers' Market vendors and their customers.

Indicators for Nutrition and Health include:

- Consumption of fruits and vegetables;
- Consumption of calcium-rich foods;
- Physical activity.

Cross-cutting or Cross-disciplinary Initiatives: AES food safety research emphasizes pre-harvest management of livestock to prevent transmission of human pathogens in livestock production and handling and post-harvest detection and management systems to prevent contamination of meat and plant products with human pathogens. The AES research program in human nutrition focuses on basic research to understand:

- the interrelationships between nutrition, exercise, and human health, and
- the basic biochemistry of human nutrition.

Animal Production Systems

Program Goals: Adoption of improved crop production technologies, wheat cultivars and productive and sustainable agriculture systems will assure communities, families, and individuals have enough food to eat, and that hunger is not a factor in their well-being.

Extension, AES, or Integrated: Integrated
New Programs, and/or Addressing NIFA Priorities:

Ongoing, Consistent, and/or Successful Programs: AES focuses on fundamental and applied research in breeding, nutrition, physiology, behavior, integrated resource management systems, economics, health, and range/forage management. Extension outreach spans the breadth of the topics of research to assure that industry participants have practical knowledge in modern beef, dairy, and sheep production systems, biosecurity, economic and risk management, and response to policy and consumer changes. Outreach to youth involved in livestock production and judging events continues as part of experiential learning in 4-H, FFA, and college judging. Producers realize increased prices and lower cost of production. Consumers benefit from higher human nutritional values of food. The beef cattle selection decision support system is intended for use by beef cattle producers to simplify selection and purchase of breeding animals by evaluating potential replacement animals on expected profitability of their offspring. This system of development is predicated on complaints by many breeders who felt overwhelmed by amount of information available on animals with which to make selection decisions. This system has the potential to have a large influence on profitability of beef production. If bulls are used for 3 breeding seasons with an average of 25 offspring produced per season, each of these 10,000 bulls would produce a total of 75 offspring. If the system yields only an average of \$10 more profit per progeny produced, the economic result for participating associations and breeders would be approximately \$7 million in profit.

Cross-cutting or Cross-disciplinary Initiatives: Global Food Security and Hunger work, of necessity, includes animal and plant production systems and integrates Extension education in disseminating research results. CSU Extension & Research:

- Conduct basic and applied research in animal production systems;
- Delivers workshops and educational classes for producers;
- Communicates results through demonstrations and field days;
- Provide individual counseling for producers and clientele on specific animal production

problems.

Plant Production Systems

Program Goals: Adoption of improved crop production technologies, wheat cultivars and productive and sustainable agriculture systems will assure communities, families, and individuals have enough food to eat, and that hunger is not a factor in their well-being.

Extension, AES, or Integrated: Integrated

New Programs, and/or Addressing NIFA Priorities: The AES research program in human nutrition focuses on basic research to understand:

- the interactions between plant composition and human health;
- the interrelationships between nutrition, exercise, and human health; and
- the basic biochemistry of human nutrition.

Molecular biology and genomics will open new pathways for crop plant improvement and pest management that support economic development, enhance human health through more nutritious and safer food products, and find fundamental solutions through renewable and sustainable crop production and pest management. Research in plant production systems will inform Extension activities and programs as CSU contributes to solving the dilemmas inherent in the Global Food Security & Hunger NIFA priority.

Ongoing, Consistent, and/or Successful Programs: AES focuses on fundamental and applied research in breeding, nutrition, physiology, behavior, integrated resource management systems, economics, health, and range/forage management. Extension outreach spans the breadth of the topics of research to assure that industry participants have practical knowledge in modern plant, beef, dairy, and sheep production systems, biosecurity, economic and risk management, and response to policy and consumer changes. Crop production in the state benefits from AES and Extension through improved crops which resist environmental and biological pests. Producers realize increased prices and lower cost of production. Consumers benefit from higher human nutritional values of food.

Cross-cutting or Cross-disciplinary Initiatives: Global Food Security and Hunger work, of

necessity, includes animal and plant production systems and integrates Extension education in disseminating research results. CSU Extension and Research:

- Conduct basic and applied research in plant production systems;
- Deliver workshops and educational classes for producers;

Communicates results through demonstration plots and field days;

- Provides individual counseling for producers and clientele on specific plant production problems.

'Wheat Improvement' is a well-organized and highly-functioning Extension work team that maintains its structure and contributes to the NIFA priority goal of global food security. Since inception of the program in 1963, the CSU Wheat Breeding Program has released over 29 improved wheat cultivars. CSU-bred wheat cultivars account for over 60% (or 72% of the accounted-for acreage) of Colorado's 2.45 million acres (2010 crop) with the remaining acreage planted mostly with cultivars from university breeding programs in adjacent states. Since inception of the program, average wheat grain yields in Colorado have more than doubled with at least 50% of this increase attributed to improved cultivars. While the value of these yield increases varies according to market prices, estimates of economic returns from two of our most widely grown releases (Hatcher and Ripper) are approximately \$32.3 million for the 2010 crop alone (estimated \$21.9 million for yield improvement and \$10.3 million for quality improvement). As a whole, estimates from Colorado wheat industry leaders on CSU-developed quality improvements suggest that end-use quality enhancements from cultivars developed at CSU provide an average of \$17.5 million per year increased income for Colorado wheat producers (70 million bushels average x \$0.25 per bushel price increase; 2010 dollars).

Since 1975, there have been 27 potato cultivars/clonal selections released by Colorado State University or in cooperation with other agencies. Colorado State University releases accounted for 59% of the 55,500 acres planted to fall potatoes in Colorado in 2010. Colorado cultivars and clonal selections accounted for 44% of the 12,053 acres of Colorado certified seed accepted for certification in 2010. Advanced Colorado selections accounted for another 1% of the seed acreage. Three of the top 10 russet cultivars grown for seed in the U.S. [Canela Russet (#7), Rio Grande Russet (#8), Russet Norkotah-S3 (#9) in 2009 were developed by the Colorado program. Also for reds Sangre-S11 ranked #7. For colored-fleshed specialties, Mountain Rose and Purple Majesty both ranked #1 among red- and purple-fleshed cultivars.

Demand for organic vegetable seed is growing rapidly as the USDA National Organic Program requires organic farmers to use certified organic seed when available. With this potential, there is an opportunity to re-establish the seed production industry in the Arkansas Valley in Colorado. A study was conducted to characterize the fresh market and seed yield response of organically-grown watermelon (Crimson Sweet) to different mulching methods. Gross returns without plasticulture average \$3000 per acre. With plasticulture, gross returns reach \$6000 per acre with approximately \$200 additional cost for plastic or a net marginal income increase of \$2800 per acre.

Cross-cutting or Cross-disciplinary Initiatives: As recommended by NIFA reviewers, CSU Extension's Work Teams for animal production, and plant production systems work teams are considering combining under the goal of global food security.

Natural Resources and Environment

Program Goals: Programs sustain and/or improve the quality and quantity of Colorado's natural resources and environment.

Extension, AES, or Integrated: Integrated

New Programs, and/or Addressing NIFA Priorities: The US Census of Agriculture reports decreasing numbers of mid- and large-sized farms and a significant increase in the number of small farms. Small acreage owners/operators frequently may not possess much agricultural or business knowledge. AES and Extension address the needs of small acreage producers and work with agricultural industry personnel and governmental agencies to assure that land managers and communities can evaluate a broad range of opportunities to enhance viability while respecting the environment.

Ongoing, Consistent, and/or Successful Programs: AES and Extension programs address the growing competition for finite water, land, and air resources in a state with a growing human population by:

- educating agricultural and resource industry professionals;
- researching technical and economic issues related to improved resource utilization; and
- enhancing international competitiveness.

Intensive dryland cropping systems build soil organic carbon, improve soil quality, and improve both air and surface water quality because they provide high amounts of year around cover. These benefits have been realized for about 1,500,000 acres in CO that have been converted from wheat-fallow to wheat-summer crop-fallow. This conversion increased net return by \$22,275,000 per year under normal precipitation conditions. Limited irrigation cropping systems based on conservation tillage practices demonstrated in this project build soil organic carbon, improve soil quality, and improve both air and surface water quality because they provide high amounts of year around cover. These benefits have the potential to affect as much as 2,000,000 acres in CO. Survey results from this project document that irrigated farmers in the South Platte River Basin have a willingness to adopt limited irrigation cropping systems and that there will be adequate water savings to meet projected urban water demand through water lease arrangements.

The Arikaree River, on the eastern plains of Colorado, is fed by the High Plains Aquifer and provides both unique habitat for the endangered fish species and irrigation water for agricultural production. Research has shown that the aquifer has been declining at approximately 0.25 m/year throughout the region and in some locations, it is dropping at 0.58 m/year based on farmer observations. A water conservation survey was distributed to farmers in Eastern Colorado (predominately in Yuma County) to identify the top three conservation alternatives in each section. The water conservation sections were field practices, irrigation practices, management practices, programs, and conversion to less water consumptive crops. A numerical water balance model of the alluvial aquifer-stream system was developed to link groundwater to pool depths in the Arikaree River. The calculations show that the river is at a critical point for preservation and could go dry in the next 8 to 12 years with no changes to the current pumping. This research shows that to maintain the current HPA water levels and alluvial aquifer, it would require 77% participation in the water conservation programs or reduction of at least 44.8 million cubic meters of irrigation pumping.

Cross-cutting or Cross-disciplinary Initiatives: Nutrient management and odor and dust control.

Community Resource Development (CRD)

Program Goals: CRD Programs provide tools so that citizens can make informed decisions to increase tax revenues, maintain and/or increase employment, and maintain and/or grow valued community resources.

Extension, AES, or Integrated: Extension

New Programs, and/or Addressing NIFA Priorities: Community Resource Development (CRD), and its partner, Economic Development, are highlighted by the Vice President for Engagement and Director of Extension.

Ongoing, Consistent, and/or Successful Programs: Colorado communities are changing rapidly as a result of many factors, including loss of agricultural water, influx of retirement populations, development of gas and oil industries, incidence of military deployment, and changes in cultural background of residents. Communities struggle to develop and maintain resources: human, financial, physical, social, environmental, and political. They also are challenged to provide the organizational capacity to assess, plan, and implement activities to address resource development and management. These issues especially are acute in smaller rural communities. Colorado's rural communities are relatively unique in terms of sparse populations, a high natural amenity and public lands base, a transitory population, and relatively low public service provision. Communities require knowledge to evaluate their resource base, their economic and social service alternatives, and their futures.

Statewide population in Colorado is forecasted to more than double over the next 50 years. The state of Colorado is currently trying to determine how best to meet the water needs of future residents. Water

conservation and the reallocation of water from Ag to municipal uses are the two most likely candidates for meeting new demands. Project activities focused on developing a better understanding of how to successfully design alternative market-based instruments which allow for the reallocation of water from ag to urban uses without the negative side effects associated with traditional "buy and dry" methods. Results from an experimental water market suggest that while the introduction of active water leasing markets will result in more water in agriculture, it may make irrigators worse off. These results directly address questions/concerns raised by irrigators about participating in water leasing. These results were communicated to state officials, who indicated they will incorporate these findings into future discussions regarding the design of alternative institutions. The results provide insight into why many in irrigated agriculture are reluctant to participate in alternatives to traditional water rights transfers.

Cross-cutting or Cross-disciplinary Initiatives: CRD technologies will be provided through training and technical assistance to Extension agents, as the system views CRD as a process rather than an issue. The goal is to intentionally integrate CRD into all issues work.

Clean Energy Strategic Initiative

Program Goals: Diffuse and adopt renewable energy sources and sustainable practices that reduce dependence on nonrenewable energy through public knowledge of energy efficiency and clean energy options.

Extension, AES, or Integrated: Extension

New Programs, and/or Addressing NIFA Priorities: Clean energy interests and efforts were organized as an Extension 'strategic initiative team' in fall, 2008. Progress by the team is reflected in showing the work as a planned program, and including it in the Program Leadership Team as a Program Area. While not all clean energy is sustainable, it is an area of high interest to county partners, as documented by a search of county priorities on Web sites throughout the state. The Work Team's objective is to educate a core group of Extension agents about renewable energy options and energy efficiency, and to broadly educate all Extension agents on the basics of renewable energy. Deliverables include:

- demonstration sites;
- short term classes;
- partnerships with campus faculty;
- green jobs programs for schools;
- school enrichment materials using STEM-based standards.

Ongoing, Consistent, and/or Successful Programs: The long range intention is that Extension will be considered the educational entity of choice in the area of clean energy. These activities and intentions are recognized as outputs, as the planned program is very new and not fully resourced. The Work Team will create its Logic Model and articulate outcomes for the immediate, short, and long term.

Cross-cutting or Cross-disciplinary Initiatives: A newly hired Clean Energy Specialist can more effectively connect Extension's clean energy efforts with multiple research and teaching opportunities that are ongoing in several colleges on campus.

Total Actual Amount of professional FTEs/SYs for this State

Year: 2010	Extension		Research	
	1862	1890	1862	1890
Plan	150.0	0.0	50.0	0.0
Actual	138.4	0.0	48.7	0.0

II. Merit Review Process

1. The Merit Review Process that was Employed for this year

- Internal University Panel
- External Non-University Panel
- Combined External and Internal University External Non-University Panel

2. Brief Explanation

All projects conducted by the AES and Extension are subjected to a peer review process. Each college at Colorado State University has adopted a process for conducting a peer review on all AES and Extension projects submitted for support by state and federal funds. Criteria include alignment with college priorities, resource allocation, and meeting needs of Coloradoans.

In addition, Extension programs are subject to review by the Program Leadership Team (PLT) and Program Area Leaders (PALs). Extension is identifying, through a focusing effort, areas of emphasis for program delivery. In March, 2010, PALs, Work Team Leaders, county agents, county directors, Regional Directors, and Extension administrators convened to focus programs in other areas. Currently, Extension specialists and agents team together on about 20 work teams (WT), jointly lead by a specialist and an agent. Each WT has completed a Logic Model, including providing a situation statement, identification of inputs, outputs and impacts. WT Plans of Work were approved by the Associate Director by July 1, 2009. All plans were updated during the fall, 2010, in order to be posted to a new on-line planning and reporting system. Additional groups will provide content support, process direction, and/or audience/delivery training.

At the county level, all county Extension programs are required at a minimum to have an Extension Advisory Committee composed of constituents, partner agencies (such as the school districts, councils on aging, county health and human services, commodity groups, etc.) In addition, many counties have multiple program advisory groups that guide the county staff in identification of specific programs of emphasis. In the most recent survey of these committees, the 59 Extension county programs have a total of 112 advisory committees involving close to 2000 individuals in the program review process. County programs are reviewed and evaluated by these county advisory groups. The primary criteria is meeting needs in the county.

III. Stakeholder Input

1. Actions taken to seek stakeholder input that encouraged their participation

- Use of media to announce public meetings and listening sessions
- Targeted invitation to traditional stakeholder groups
- Targeted invitation to non-traditional stakeholder groups
- Targeted invitation to traditional stakeholder individuals
- Targeted invitation to non-traditional stakeholder individuals

- Targeted invitation to selected individuals from general public
- Survey of traditional stakeholder groups
- Survey of traditional stakeholder individuals
- Survey of the general public
- Survey specifically with non-traditional groups
- Survey specifically with non-traditional individuals
- Survey of selected individuals from the general public
- Other (Survey of County Commissioners regarding Extension Programs in their county.)

Brief explanation.

The AES and Extension annually utilize multiple means of obtaining stakeholder input on programs conducted and solicit input on changes in program direction. The AES and Extension support programs in seven of the eight colleges on the Colorado State University campus as well as at nine off-campus research centers, one regional engagement center, 54 individual county offices and three area programs serving 59 counties. Each year, the off-campus research centers hold a public meeting where research results are presented and proposed programs are discussed. Public input is solicited on all programs. It should be noted that many of the programs discussed involve faculty and staff located on the Fort Collins campus as well as at the off-campus research centers and Extension county or area offices. Each County/Area Extension program is required to have a stakeholder advisory committee, representing all programmatic and geographic areas, as well as the diversity found in the county. Evidence of the advisory committee must be documented in performance appraisals, as well as during the regularly scheduled affirmative action reviews. These advisory committees are expected to meet on a regular basis and provide guidance on programming and target audiences. Finally, a state Extension Advisory Committee, representing both program recipient groups, as well as programmatic collaborators provides oversight and input at the state level. Yearly the county advisory committees review the county plans of work which are then incorporated into the statewide work team plans. These plans are reviewed by the Colorado Extension Advisory Committee (CEAC) for additional input and acceptance. There is an open call for additional work teams so that additional priority areas may be identified and state-wide focus provided. Diversity among stakeholders is expected, but as NIFA reviewers have noted, it is not documented.

2(A). A brief statement of the process that was used by the recipient institution to identify individuals and groups stakeholders and to collect input from them

1. Method to identify individuals and groups

- Use Advisory Committees
- Use Internal Focus Groups
- Use External Focus Groups
- Open Listening Sessions
- Use Surveys
- Other (Council for Agricultural Research, Extension, and Teaching)

Brief explanation.

We identify stakeholder groups through input from county staff and advisory committee members. We engage community partners in the process and request feedback on appropriate

individuals and groups to be included in the stakeholder input process.

Both AES and Extension meet regularly with advisory committees to solicit feedback on programs and also invite the general public to participate in listening sessions.

2(B). A brief statement of the process that was used by the recipient institution to identify individuals and groups who are stakeholders and to collect input from them

1. Methods for collecting Stakeholder Input

- Meeting with traditional Stakeholder groups
- Survey of traditional Stakeholder groups
- Meeting with traditional Stakeholder individuals
- Survey of traditional Stakeholder individuals
- Meeting specifically with non-traditional groups
- Meeting specifically with non-traditional individuals
- Meeting with invited selected individuals from the general public
- Survey of selected individuals from the general public
- Other (Review of county web sites to discern priorities)

Brief explanation.

AES and Extension staff meet regularly with advisory committees and other stakeholders to solicit input on program direction, focus, implementation and success. In addition, CSU has required a yearly satisfaction survey of county commissioners regarding the Extension program in their county. That survey has provided valuable information on county needs and the impact/success of the Extension programs.

3. A statement of how the input will be considered

- To Identify Emerging Issues
- Redirect Extension Programs
- Redirect Research Programs
- In the Staff Hiring Process
- In the Action Plans
- To Set Priorities

Brief explanation.

Input from stakeholder groups/individual is expected to be reflected in programming changes - both suggestions for new programs and changes to existing programs at the county/area level. In addition, programmatic suggestions are funneled from county stakeholders to the State Extension Advisory Committee for consideration, recommendation, and implementation. The AES research program is modified based on input from stakeholders. Examples include an evaluation of oilseeds that was initiated to assess bioenergy potential based on stakeholder requests; multi-disciplinary and integrated activities are conducted on invasive plants; and the goals of wheat breeding program that reflect the needs of the wheat industry. In essence, ongoing interaction with stakeholders through formal and informal means is used to insure program relevancy.

Brief Explanation of what you learned from your Stakeholders

County needs must take priority.

IV. Expenditure Summary

1. Total Actual Formula dollars Allocated (prepopulated from C-REEMS)			
Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
3070770	0	3057471	0

2. Totaled Actual dollars from Planned Programs Inputs				
Extension			Research	
	Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
Actual Formula	2889169	0	3226382	0
Actual Matching	2889169	0	3226382	0
Actual All Other	6915164	0	29229772	0
Total Actual Expended	12693502	0	35682536	0

3. Amount of Above Actual Formula Dollars Expended which comes from Carryover funds from previous				
Carryover				
	2605620	0	168911	0

V. Planned Program Table of Content

S. No.	PROGRAM NAME
1	4-H Youth Development
2	Nutrition and Food Safety
3	Strong Families, Healthy Homes
4	Animal Production Systems
5	Plant Production Systems
6	Natural Resources and Environment
7	Community Resource Development
8	Clean Energy Strategic Initiative

V(A). Planned Program (Summary)

Program # 1

1. Name of the Planned Program

4-H Youth Development

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
802	Human Development and Family Well-Being	5%		0%	
806	Youth Development	95%		0%	
	Total	100%		0%	

V(C). Planned Program (Inputs)

1. Actual amount of professional FTE/SYs expended this Program

Year: 2010	Extension		Research	
	1862	1890	1862	1890
Plan	50.0	0.0	0.0	0.0
Actual	47.9	0.0	0.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
1000625	0	0	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
1000625	0	0	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
2394975	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

- Support traditional organized 4-H club programs by recruiting and establishing new clubs;
- Conduct afterschool and school enrichment programs that provide curriculum in leadership,

citizenship and life skills development;

- Develop new curriculum in response to new audience needs;
- Strengthen the volunteer management system needed to implement the 4-H Youth

Development program by:

- o Conducting agent trainings to develop volunteer management skills,
- o Developing tools to support volunteer management system,
- o Delivering volunteer leader training, and
- o Developing new funding support through individual and group solicitation, grant applications and fee-for-service programs.

2. Brief description of the target audience

- For 4-H Youth Development programming the target audience includes all Colorado youth, ages 5 - 19.
- For volunteers, the audience includes interested adults, parents, community members, seniors, and partner agencies (Boys and Girls Clubs, Scouts, Parks & Recreation, etc.)
- For increased funding the target audience is potential funders, including donors and grant providers.

V(E). Planned Program (Outputs)

1. Standard output measures

2010	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	10685	49294	93627	334839

2. Number of Patent Applications Submitted (Standard Research Output)

Patent Applications Submitted

Year: 2010

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2010	Extension	Research	Total
Actual	2	0	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Increased funding for 4-H Youth Development through private dollars by increasing support from the Colorado 4-H Foundation. (These have been increased based on 2005-06 actual of \$240,000.)

Year	Actual
2010	485083

Output #2

Output Measure

- Number of web hits regarding 4-H topics

Year	Actual
2010	551017

Output #3

Output Measure

- Number of youth reached by all 4-H delivery methods-club, after school, school enrichment. These numbers are being revised upward based on actual numbers for 2006-07 program year.

Year	Actual
2010	95697

Output #4

Output Measure

- New/revised curriculum to meet changes in needs for youth audiences.

Year	Actual
2010	77

Output #5

Output Measure

- Number of volunteer management trainings held and tools developed.

Year	Actual
2010	229

Output #6

Output Measure

- Number of volunteer leaders. (These have been reduced to reflect the anticipated increase from a current base of 8900.)

Year	Actual
2010	11024

Output #7

Output Measure

- Number of on-line e-Learning orientation modules completed by volunteers.

Year	Actual
2010	821

Output #8

Output Measure

- Amount of grant dollars generated to support 4-H Youth Development programs.

Year	Actual
2010	119841

Output #9

Output Measure

- Value of volunteers' time that Colorado 4-H adult volunteers provide to 4-H programming, based an average donation of 128 hours/volunteer at \$19.51/hour (national average for value of time)

Year	Actual
2010	30300000

Output #10

Output Measure

- Increased volunteer leaders' effectiveness as measured by retention rate of first year leaders.

Year	Actual
2010	95

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Percent of youth reporting positive change in life skills including leadership, citizenship, decision making and communications skills as a result of 4-H participation.
2	Percent of volunteers reporting increased skills in area of responsibility.
3	Percent of volunteer reporting an increase in knowledge in relation to 4-H and/or youth development.
4	Percent of participants evaluated who report they changed an attitude, intended to change a behavior, or changed a behavior

Outcome #1

1. Outcome Measures

Percent of youth reporting positive change in life skills including leadership, citizenship, decision making and communications skills as a result of 4-H participation.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	80	84

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

In order for youth in Colorado to cultivate critical life skills, the 4-H Youth Development work team strives to incorporate the three mission mandates from the National 4-H Council which are Science, Engineering and Technology (SET), Healthy Living and Citizenship.

What has been done

4-H Youth Development program delivery is in one of six different delivery methods 1) Organized clubs, 2) School enrichment, 3) Short term/special interest, 4) School-age child care, 5) After school programs, 6) Camping.

Results

84% of participants evaluated reported they had gained knowledge about 4-H Science, Meat Quality Assurance (MQA), Level Rater, Dog Leader, Computer Project, and/or GIS/GPS.

4. Associated Knowledge Areas

KA Code	Knowledge Area
802	Human Development and Family Well-Being
806	Youth Development

Outcome #2

1. Outcome Measures

Percent of volunteers reporting increased skills in area of responsibility.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	75	77

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Extension Agents play a critical role in communities yet they are often over committed and under staffed when considering local needs. Volunteers play an integral role in 4-H Youth Development program design, implementation and evaluation. Extension could not offer the depth and breadth of programs it does without volunteers.

What has been done

Volunteers in 4-H Youth Development programs all proceed through a sequence of application and selection methods to ensure uniform, minimal levels of screening. Volunteers all have access to and receive consistent levels of orientation and training.

Results

77% of volunteers evaluated report they have increased skills in problem-solving, planning, organizing, decision-making, and/or leadership.

4. Associated Knowledge Areas

KA Code	Knowledge Area
802	Human Development and Family Well-Being
806	Youth Development

Outcome #3

1. Outcome Measures

Percent of volunteer reporting an increase in knowledge in relation to 4-H and/or youth development.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	{No Data Entered}	99

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Extension Agents play a critical role in communities yet they are often over-committed and under-staffed when considering local needs. Volunteers play an integral role in program design, implementation and evaluation.

Extension could not offer the depth and breadth of programs it does without volunteers.

What has been done

Volunteers in 4-H Youth Development programs all proceed through a sequence of application and selection methods to ensure uniform, minimal levels of screening. Volunteers all have access to and receive consistent levels of orientation and training.

Results

99% of volunteers evaluated reported they had increased knowledge in the main partners of 4-H, the essential elements of 4-H, experiential learning, life skills, stages of youth development, characteristics of successful groups, appropriate teaching tools, elements of community service, demonstrations and talks, actions to organize a meeting, and/or techniques for conducting a meeting.

4. Associated Knowledge Areas

KA Code	Knowledge Area
802	Human Development and Family Well-Being
806	Youth Development

Outcome #4

1. Outcome Measures

Percent of participants evaluated who report they changed an attitude, intended to change a behavior, or changed a behavior

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	{No Data Entered}	64

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Quality communities in Colorado depend on quality, contributing members of society. Fostering productive community members begins with our young people. 4-H is Extension's youth development program area. Positive youth development addresses broader developmental needs of youth, in contrast to deficit-based models which focus solely on youth problems. Positive youth development occurs from an intentional process that promotes outcomes for young people by providing opportunities, relationships and, externally, through the delivery of projects and curriculum designed according to the best practices of youth development.

What has been done

4-H Youth Development Program delivery is in one of six different delivery methods 1) Organized clubs, 2) School enrichment, 3) Short term/special interest, 4) School-age child care, 5) After school programs, 6) Camping.

Results

64% of participants evaluated reported they had changed an attitude, intended to change a behavior, or changed a behavior regarding 4-H Science, Meat Quality Assurance (MQA), Level Rater Trainings, Dog Leader Trainings, Computer Project, and/or GIS/GPS.

4. Associated Knowledge Areas

KA Code	Knowledge Area
802	Human Development and Family Well-Being
806	Youth Development

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Economy
- Appropriations changes
- Public Policy changes
- Competing Public priorities
- Competing Programmatic Challenges
- Populations changes (immigration, new cultural groupings, etc.)
- Other (competing family priorities)

Brief Explanation

Participation in 4-H Youth Development programs does not come without cost. If funding is not sufficient, scholarship help for families may not be available and individuals may be forced to not participate. Families have the opportunity to choose from many different activities for youth. 4-H may lose membership to other youth activities. At the same time, population shifts to urban sites could increase 4-H Youth Development participation if 4-H is able to establish relevant programs in non-rural environments.

V(I). Planned Program (Evaluation Studies and Data Collection)

Evaluation Results

County youth who participate in 4-H programs and are able to use the resources and research available through CSU or other land grant universities to develop their lifelong personal skills such as responsibility, service to others and leadership.

Key Items of Evaluation

4-H programs provide youth with hands-on educational activities to complement knowledge gained in their structured educational setting, including STEM.

V(A). Planned Program (Summary)

Program # 2

1. Name of the Planned Program

Nutrition and Food Safety

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
701	Nutrient Composition of Food	0%		20%	
702	Requirements and Function of Nutrients and Other Food Components	1%		0%	
703	Nutrition Education and Behavior	73%		40%	
704	Nutrition and Hunger in the Population	4%		0%	
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources	0%		10%	
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins	10%		20%	
724	Healthy Lifestyle	12%		0%	
805	Community Institutions, Health, and Social Services	0%		10%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of professional FTE/SYs expended this Program

Year: 2010	Extension		Research	
	1862	1890	1862	1890
Plan	28.0	0.0	6.0	0.0
Actual	24.3	0.0	4.8	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
507261	0	678236	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
507261	0	678236	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
1214119	0	5829804	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

- Food Safety Education
 - o Food Safety training for consumers, high risk audiences and their caregivers (Eat Well for Less, La Cocina Saludable, Worksite Wellness, Safe Home Food Preparation and Preservation, Promotion at Farmers Markets)
 - o Food Safety Training for Food Service Managers and Workers (Food Safety Works, ServSafe, Food Safety for Food Bank Workers)
- Promoting Food Security
 - o Multi-lesson series programs including Eat Well for Less, La Cocina Saludable
 - o Single event programs targeting limited resource families
 - o Newsletters including Senior Nutrition News
- Health Promotion/Chronic Disease Prevention
 - o Multi-lesson series including Dining with Diabetes, Small Changes Make a Big Difference, Strong Women-Strong Bones, Moving Toward a Healthier You, Healthy Heart, Smart-START for a Healthy Heart
 - o Self-paced program: Self-Care for a Healthy Heart
 - o Single lessons: Workable Wellness (worksite wellness)
 - o Youth program including Food Friends/Making New Foods Fun for Kids, Eating Right Is Basic, Chef Combo's Fantastic Adventures in Tasting and Nutrition, Professor Popcorn
- Research
 - o Technical and extension publications
 - o Development of new technologies for improving food safety
 - o Development of recommendations on diet, exercise or other health related topics

2. Brief description of the target audience

Food Safety Education

- Consumers
- High risk audiences (pregnant, immuno-compromised, elderly)
- Food handlers and their managers at retail food establishments

- Producers and processors of plant and animal agricultural products

Health Promotion/Chronic Disease Prevention

- Individuals at risk for diabetes, heart disease, obesity (adults and youth)
- Seniors at risk for osteoporosis
- Youth (nutrition focus)

V(E). Planned Program (Outputs)

1. Standard output measures

2010	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	220723	8278534	5256	0

2. Number of Patent Applications Submitted (Standard Research Output)

Patent Applications Submitted

Year: 2010

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2010	Extension	Research	Total
Actual	13	75	88

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of trainings in nutrition and food safety held.

Year	Actual
2010	5907

Output #2

Output Measure

- Grant dollars (external) received to support Nutrition and Food Safety

Year	Actual
2010	12289857

Output #3

Output Measure

- Number of individuals reached by newsletters on nutrition and food safety distributed.

Year	Actual
2010	9992723

Output #4

Output Measure

- Technical publications on food safety and nutrition.

Year	Actual
2010	13

Output #5

Output Measure

- Number of individuals trained via workshops in nutrition and food safety

Year	Actual
2010	19970

Output #6

Output Measure

- Number of partnering agencies in Colorado who collaborated in nutrition and food safety efforts.

Year	Actual
2010	420

Output #7

Output Measure

- Number of volunteers supporting nutrition and food safety

Year	Actual
2010	595

Output #8

Output Measure

- Number of curriculums developed or reviewed that support nutrition and food safety

Year	Actual
2010	36

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Percent of participants at trainings in Food Safety indicating an increase in knowledge gained
2	Percent of participants reporting a change in attitude regarding Food Safety.
3	Percent of participants indicating a change in behavior as a result of Food Safety training
4	Percent of participants demonstrating a change in knowledge regarding Nutrition.
5	Percent of participants documenting a change in behavior following participation in workshop on nutrition, diet, and health.
6	Facilitation of international trade of food products.
7	Basic research on human nutrition.

Outcome #1

1. Outcome Measures

Percent of participants at trainings in Food Safety indicating an increase in knowledge gained

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	70	94

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The aim of the Food Safety Education Work Team program of work is to provide information and guidance to a variety of audiences across Colorado to promote understanding and adoption of safe food production, handling, and preservation practices that help to enhance food quality and decrease the incidence of foodborne illness.

What has been done

Food Safety Works Safe Food Handler Program for Retail Food Establishments

ServSafe(r) Food Program Manager Certification Program

Consumer Food Preservation Classes/Workshops

Master Food Safety Advisor Volunteer Program (MFSA)

Good Agricultural and Handling Practices (GAP/GHPs) Training

Healthy Baby, Healthy Me

Listeria Prevention Training for Nutrition and Health Care Professionals

To Your Health! Food Safety for Seniors

Growing Healthy Habits: Food Safety for Home and Community Gardeners

Living a Gluten-Free Lifestyle

Food Safety for Groups and Community Kitchens

Results

94% of participants who were evaluated after training indicated a change in knowledge about safe food handling practices, when and how to wash hands, and/or safe food preservation methods.

100 % of participants evaluated said they gained knowledge about food safety issues concerning children and pregnant women, and 99% about issues concerning seniors.

4. Associated Knowledge Areas

KA Code	Knowledge Area
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins

Outcome #2

1. Outcome Measures

Percent of participants reporting a change in attitude regarding Food Safety.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	70	92

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The aim of the Food Safety Education Work Team program of work is to provide information and guidance to a variety of audiences across Colorado to promote understanding and adoption of safe food production, handling, and preservation practices that help to enhance food quality and decrease the incidence of food-borne illness.

What has been done

Personal hygiene (hand-washing: I wash my hands with soap and warm running water for at least 20 seconds before preparing food and after handling raw meat, chicken, or seafood).

Avoiding cross-contamination: I use clean cutting boards and knives for cutting fresh produce.

Using tested recipes for preserving and preparing food: I follow food preservation recipes and procedures that have been tested and adjusted for altitude when needed.

Adequate temperatures: I use a thermometer to test cooking temperatures (pregnant women: I heat hot dogs and deli meats to steaming before eating).

Results

92% of participants evaluated reported attitude change/intent to change behavior in safe food handling practices, when/how to wash hands, and/or safe food preservation methods. 100% of participants evaluated reported attitude change/intent to change behavior in food safety issues concerning children and pregnant women, and 93% concerning seniors.

4. Associated Knowledge Areas

KA Code	Knowledge Area
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins
724	Healthy Lifestyle

Outcome #3

1. Outcome Measures

Percent of participants indicating a change in behavior as a result of Food Safety training

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	70	74

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The aim of the Food Safety Education Work Team program of work is to provide information and guidance to a variety of audiences across Colorado to promote understanding and adoption of safe food production, handling, and preservation practices that help to enhance food quality and decrease the incidence of foodborne illness.

What has been done

Food Safety Works Safe Food Handler Program for Retail Food Establishments

ServSafe(r) Food Program Manager Certification Program

Consumer Food Preservation Classes/Workshops

Master Food Safety Advisor Volunteer Program (MFSA)

Good Agricultural and Handling Practices (GAP/GHPs) Training

Healthy Baby, Healthy Me

Listeria Prevention Training for Nutrition and Health Care Professionals

To Your Health! Food Safety for Seniors

Consumer Food Safety in the Workplace (Work Site Food Safety)

Growing Healthy Habits: Food Safety for Home and Community Gardeners

Living a Gluten-Free Lifestyle

Food Safety for Groups and Community Kitchens

Results

74% of participants evaluated report behavior change/use of skills in relation to safe food handling practices, when/how to wash hands, and/or safe food preservation methods. 100% reported behavior change/use of skills when serving children safe food; 95% following safe food recommendations for pregnancy; 86% for seniors.

4. Associated Knowledge Areas

KA Code	Knowledge Area
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins
724	Healthy Lifestyle

Outcome #4

1. Outcome Measures

Percent of participants demonstrating a change in knowledge regarding Nutrition.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	70	72

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The Nutrition and Health Promotion Work Team provides research-based nutrition and health education to a variety of audiences across Colorado in an effort to promote healthful nutrition, activity and lifestyle behaviors. Adoption of healthful behaviors may reduce the incidence of chronic diseases, such as diabetes, heart disease, obesity and cancer, thus impacting health insurance premiums, mortality rates, and employee productivity.

What has been done

Programming used various curricula in different modalities (e.g. class series, extended single events, single events, or newsletters).

Results

72% of participants evaluated reported they gained knowledge about good sources of Calcium and Vitamin D; recommended levels of physical activity; risk factors for chronic disease; foods high in fiber; and/or recommended number of servings of fruits and vegetables.

4. Associated Knowledge Areas

KA Code	Knowledge Area
703	Nutrition Education and Behavior
704	Nutrition and Hunger in the Population
724	Healthy Lifestyle

Outcome #5

1. Outcome Measures

Percent of participants documenting a change in behavior following participation in workshop on nutrition, diet, and health.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	50	67

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The Nutrition and Health Promotion Work Team provides research-based nutrition and health education to a variety of audiences across Colorado in an effort to promote healthful nutrition, activity and lifestyle behaviors. Adoption of healthful behaviors may reduce the incidence of chronic diseases, such as diabetes, heart disease, obesity and cancer, thus impacting health insurance premiums, mortality rates, and employee productivity.

What has been done

Programming used various curricula in different modalities (e.g. class series, extended single events, single events, or newsletters).

Results

67% of participants evaluated reported they intended to change behavior, or did change behavior/use of skills about strength training; food choices; accumulating at least 30 minutes of physical activity per day; eating more fruits and vegetables; eating more Calcium and Vitamin D; and or eating more fiber-rich foods. SNAP-Ed participants who were evaluated indicated they saved \$35 on their monthly food bill and did not run out of food as often. EFNEP participants who were evaluated reported improvement in one or more of their food resource management practices, physical activity, and/or eating a variety of foods.

4. Associated Knowledge Areas

KA Code	Knowledge Area
703	Nutrition Education and Behavior
704	Nutrition and Hunger in the Population
724	Healthy Lifestyle

Outcome #6

1. Outcome Measures

Facilitation of international trade of food products.

Not Reporting on this Outcome Measure

Outcome #7

1. Outcome Measures

Basic research on human nutrition.

Not Reporting on this Outcome Measure

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Public Policy changes
- Government Regulations
- Competing Public priorities
- Competing Programmatic Challenges

Brief Explanation

- For 4-H Youth Development programming the target audience includes all Colorado youth, ages 5 - 19.
- For volunteers, the audience includes interested adults, parents, community members, seniors, and partner agencies (Boys and Girls Clubs, Scouts, Parks & Recreation, etc.)
- For increased funding the target audience is potential funders, including donors and grant providers.

V(I). Planned Program (Evaluation Studies and Data Collection)

Evaluation Results

The impacts and outcomes in nutrition and health measured by this work team focused primarily on two issues: chronic disease prevention and childhood obesity. Within these areas three main indicators were evaluated: fruit and vegetable consumption, calcium and Vitamin D consumption, and physical activity.

Food Safety efforts focused on personal hygiene (hand washing), food preservation, and use of adequate temperatures.

Key Items of Evaluation

Food Safety is now structured as a stand-alone Extension Work Team in order to more fully address the NIFA priority. Food Safety research and education may be integrated into other Work Teams so that they are not limited to program delivery by FCS agents, but rather viewed as integral in many aspects of AES and Extension outreach.

The Nutrition and Wellness Work Team is and will be focused on three areas, including Childhood Obesity, which is listed in future Plans of Work as a planned program in response to the NIFA priorities.

V(A). Planned Program (Summary)

Program # 3

1. Name of the Planned Program

Strong Families, Healthy Homes

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
723	Hazards to Human Health and Safety	11%		0%	
801	Individual and Family Resource Management	39%		0%	
802	Human Development and Family Well-Being	29%		0%	
805	Community Institutions, Health, and Social Services	21%		0%	
	Total	100%		0%	

V(C). Planned Program (Inputs)

1. Actual amount of professional FTE/SYs expended this Program

Year: 2010	Extension		Research	
	1862	1890	1862	1890
Plan	12.0	0.0	0.0	0.0
Actual	5.7	0.0	0.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
122445	0	0	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
122445	0	0	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
293069	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Educational activities include:

- Adoption of curriculum, training for agents, educational programs on financial management for families.
- Training (face-to-face and on-line) for care givers.
- Training for couples, parents of young children and disabled farmers
- Parenting classes for parents and train-the-trainer classes for individuals who work with parents
- Training using EPA-based indoor air quality education for agents, then the general public, builders, realtors, homeowner's associations, and homeowners.

2. Brief description of the target audience

The Target Audience includes:

- Colorado families, including diverse and difficult to reach populations.
- Care givers in day care and out-of-school-age care locations.
- Parents of young children.
- Disabled farmers.
- Owners and potential owners of homes.

V(E). Planned Program (Outputs)

1. Standard output measures

2010	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	14358	3512	1599	0

2. Number of Patent Applications Submitted (Standard Research Output)

Patent Applications Submitted

Year: 2010

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2010	Extension	Research	Total
Actual	7	0	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of trainings held on indoor air quality issues.

Not reporting on this Output for this Annual Report

Output #2

Output Measure

- Number of parenting programs held.

Year	Actual
2010	758

Output #3

Output Measure

- Agrability workshops held.

Year	Actual
2010	0

Output #4

Output Measure

- Number of trainings held for care providers.

Not reporting on this Output for this Annual Report

Output #5

Output Measure

- Trainings held in family financial management.

Year	Actual
2010	261

Output #6

Output Measure

- Number of newsletters/publications distributed.

Year	Actual
2010	60

Output #7

Output Measure

- Grant dollars (external) generated to support this program.

Year	Actual
2010	1396228

Output #8

Output Measure

- Number of individuals trained in indoor air quality issues and re-mediation.

Year	Actual
2010	0

Output #9

Output Measure

- Number of individuals trained in parenting skills.

Year	Actual
2010	1717

Output #10

Output Measure

- Number of individuals trained in agrability issues (dealing with disabilities on the farm/ranch.)

Year	Actual
2010	0

Output #11

Output Measure

- Number of care provides trained in parenting, positive discipline, child and family development, communication.
Not reporting on this Output for this Annual Report

Output #12

Output Measure

- Number of individuals trained in family financial management, financial management in later life, teen financial management, and other family finance programs.

Year	Actual
2010	5730

Output #13

Output Measure

- Number of volunteers supporting this program

Year	Actual
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2010

78

Output #14

Output Measure

- Numbers of partnering agencies supporting this program

Year

Actual

2010

0

Output #15

Output Measure

- Number of radon kits distributed
Not reporting on this Output for this Annual Report

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Percent of attendees gaining knowledge in parenting skills, effective communication, positive discipline, stress management.
2	Percent of participants changing attitudes regarding parenting, communication, positive discipline, stress management.
3	Percent of participants intending to change behavior as a result of parenting training.
4	Percent of individuals documenting change in behavior in parenting skills, communication, positive discipline, stress management.
5	Percent of attendees in indoor air quality training reporting increase in knowledge.
6	Percent of attendees changing attitudes/intending to change behavior based on knowledge gained at training on indoor air quality.
7	Percent of participants reporting change in behavior based on knowledge gained through training in indoor air quality.
8	Individual homes, and thus communities will have significantly improved indoor air quality based on remediation of indoor air pollutants.
9	Percent of participants demonstrating change in knowledge of financial management.
10	Percent of participants intending to change behavior/reporting change in attitudes regarding financial management.
11	Percent of participants in financial management training demonstrating change in behavior.
12	Family financial health significantly improved due to changes based on skills learned in financial management trainings.
13	Percent of individuals demonstrating increase in knowledge regarding strategies for dealing with disabilities on the farm/ranch.
14	Percent of participants in agrability workshops reporting change in behavior regarding coping with disabilities on the farm/ranch.

Outcome #1

1. Outcome Measures

Percent of attendees gaining knowledge in parenting skills, effective communication, positive discipline, stress management.

Not Reporting on this Outcome Measure

Outcome #2

1. Outcome Measures

Percent of participants changing attitudes regarding parenting, communication, positive discipline, stress management.

Not Reporting on this Outcome Measure

Outcome #3

1. Outcome Measures

Percent of participants intending to change behavior as a result of parenting training.

Not Reporting on this Outcome Measure

Outcome #4

1. Outcome Measures

Percent of individuals documenting change in behavior in parenting skills, communication, positive discipline, stress management.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	50	50

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Five years of research show youth 12-14 years old who attend CARE to Wait (CTW) with their parents and complete baseline, 6- 12- and -24 month surveys, enhance self-efficacy, refusal skills, relationships and communication with parents, have fewer high-risk peers and lower risky sexual behaviors (an index which includes abstinence.)

What has been done

This multi-site model provides a powerful research design: the enriched model is the family-based CTW program (20 hours) which both parents and 12-14 year-old youth attend together as compared to the youth only program for 12-14 year old youth, which is a 20 hour track for 12 to 14 year old youth only using the youth curriculum from the CTW program.

Results

Among the 50% of subjects in the experimental group, a significant change was observed at post-test on participants' attitudes and intentions related to abstinence, with this effect being larger in the enriched group as compared to the youth-only group. Sexual risk-taking declined significantly in both groups showing in intervention had an effect for both youth in the enriched and youth only interventions in this variable. Significant improvements in family relationships also were observed in both groups; parent monitoring and parent-youth communication about sex and intimacy also improved significantly more in the enriched (family) intervention than in the youth-only group. The latter three findings support the hypothesis that a family systems intervention is more likely to promote healthy family dynamics than a program that only targets teens.

4. Associated Knowledge Areas

KA Code	Knowledge Area
802	Human Development and Family Well-Being
805	Community Institutions, Health, and Social Services

Outcome #5

1. Outcome Measures

Percent of attendees in indoor air quality training reporting increase in knowledge.

Not Reporting on this Outcome Measure

Outcome #6

1. Outcome Measures

Percent of attendees changing attitudes/intending to change behavior based on knowledge gained at training on indoor air quality.

Not Reporting on this Outcome Measure

Outcome #7

1. Outcome Measures

Percent of participants reporting change in behavior based on knowledge gained through training in indoor air quality.

Not Reporting on this Outcome Measure

Outcome #8

1. Outcome Measures

Individual homes, and thus communities will have significantly improved indoor air quality based on remediation of indoor air pollutants.

Not Reporting on this Outcome Measure

Outcome #9

1. Outcome Measures

Percent of participants demonstrating change in knowledge of financial management.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	75	95

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The current recession has brought attention to the need for increased financial literacy in Colorado as well as the entire United States. Due to previous low savings rates, lack of financial savvy, and a severe economic downturn that caused high unemployment rates, many individuals and families were unprepared to weather the loss of income, balloon loan payments and other financial distress.

What has been done

The work team provides financial education on basic money management and wealth-building to

Coloradoans who are seeking to increase their financial knowledge and skills, prepare for the workforce, plan for retirement and achieve other goals such as debt reduction and increasing financial security.

Results

95% of participants evaluated reported that they had increased knowledge about legally securing their financial future; spending, saving, and sharing; small steps to health and wealth, investing for the future, elder fraud, saving on energy costs, credit education, long term care planning, and/or teaching children about money.

4. Associated Knowledge Areas

KA Code	Knowledge Area
801	Individual and Family Resource Management

Outcome #10

1. Outcome Measures

Percent of participants intending to change behavior/reporting change in attitudes regarding financial management.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	60	93

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The current recession has brought attention to the need for increased financial literacy in Colorado as well as the entire United States. Due to previous low savings rates, lack of financial savvy, and a severe economic downturn that caused high unemployment rates, many individuals and families were unprepared to weather the loss of income, balloon loan payments and other financial distress.

What has been done

The work team provides financial education on basic money management and wealth building to Coloradans who are seeking to increase their financial knowledge and skills, prepare for the workforce, plan for retirement and achieve other goals such as debt reduction and increasing financial security.

Results

93% of participants evaluated reported that they changed an attitude or intended to change a behavior about legally securing their financial future; spending, saving, and sharing; small steps to health and wealth, investing for the future, elder fraud, saving on energy costs, credit education, long term care planning, and/or teaching children about money.

4. Associated Knowledge Areas

KA Code	Knowledge Area
801	Individual and Family Resource Management

Outcome #11

1. Outcome Measures

Percent of participants in financial management training demonstrating change in behavior.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	50	74

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The current recession has brought attention to the need for increased financial literacy in Colorado as well as the entire United States. Due to previous low savings rates, lack of financial savvy, and a severe economic downturn that caused high unemployment rates, many individuals and families were unprepared to weather the loss of income, balloon loan payments and other financial distress.

What has been done

The work team provides financial education on basic money management and wealth-building to Coloradoans who are seeking to increase their financial knowledge and skills, prepare for the workforce, plan for retirement and achieve other goals such as debt reduction and increasing financial security.

Results

74% of participants evaluated reported that they had changed behavior/use of skills in legally securing their financial future; spending, saving, and sharing; small steps to health and wealth,

investing for the future, elder fraud, saving on energy costs, credit education, long term care planning, and/or teaching children about money.

4. Associated Knowledge Areas

KA Code	Knowledge Area
801	Individual and Family Resource Management

Outcome #12

1. Outcome Measures

Family financial health significantly improved due to changes based on skills learned in financial management trainings.

Not Reporting on this Outcome Measure

Outcome #13

1. Outcome Measures

Percent of individuals demonstrating increase in knowledge regarding strategies for dealing with disabilities on the farm/ranch.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	70	100

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Colorado ranchers and farmers are second only to non-construction laborers in disability rates for work-related injuries. With 37,054 farms, 59,479 operators, and 115,680 persons living on ranches/farms, it is predicted that each year 6,594 persons living on farm/ranches will sustain one or more injuries and could benefit from the Colorado AgrAbility Project (CAP). To assist these people in overcoming obstacles to continuing to farm/ranch, CAP provides information, education, and service. CAP gives them hope.

What has been done

CAP, a joint project with Colorado State University Extension and Goodwill Industries Denver offered 11 research-based educational workshops (Living with Visual Impairments and Other

Challenges on Ranches and Farms) to 44 producers and 36 professionals; wrote (and Goodwill Industries International published and disseminated) AgrAbility: A Program that Works (Fetsch, Helfrich, Field, & Olson, 2010); and made two presentations at the AgrAbility National Training Workshop. One was a five-state study on AgrAbility client program impacts with increased quality of life levels (Fetsch et al., 2010); the other was a 12-year study of Colorado AgrAbility winter workshop program impacts (Fetsch, Sump, & Little, 2010). CAP offered a conference for OTs/PTs/Extension Agents, but it was cancelled due to low pre-registration.

Results

During the past year, based on surveys completed and returned by 37 farmers/ranchers and 30 professionals immediately after participating in three-hour workshops, 100% (37/37 ranchers) and 100% (29/29 professionals) reported increased knowledge. 100% (36/36 farmers) and 100% (29/29 professionals) reported increased satisfaction levels with AgrAbility. 97% (35/36 ranchers) and 100% (29/29 professionals) plan to use the information. 100% (34/34 farmers) and 100% (29/29 professionals) want their tax dollars to continue supporting AgrAbility.

4. Associated Knowledge Areas

KA Code	Knowledge Area
723	Hazards to Human Health and Safety
801	Individual and Family Resource Management
802	Human Development and Family Well-Being
805	Community Institutions, Health, and Social Services

Outcome #14

1. Outcome Measures

Percent of participants in agribility workshops reporting change in behavior regarding coping with disabilities on the farm/ranch.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	50	75

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Colorado ranchers and farmers are second only to non-construction laborers in disability rates for work-related injuries. With 37,054 farms, 59,479 operators, and 115,680 persons living on

ranches/farms, it is predicted that each year 6,594 persons living on farm/ranches will sustain one or more injuries and could benefit from the Colorado AgrAbility Project (CAP). To assist these people in overcoming obstacles to continuing to farm/ranch, CAP provides information, education, and service. CAP gives them hope.

What has been done

CAP, a joint project with Colorado State University Extension and Goodwill Industries Denver offered 11 research-based educational workshops (Living with Visual Impairments and Other Challenges on Ranches and Farms) to 44 producers and 36 professionals; wrote (and Goodwill Industries International published and disseminated) *AgrAbility: A Program that Works* (Fetsch, Helfrich, Field, & Olson, 2010); and made two presentations at the AgrAbility National Training Workshop. One was a five-state study on AgrAbility client program impacts with increased quality of life levels (Fetsch et al., 2010); the other was a 12-year study of Colorado AgrAbility winter workshop program impacts (Fetsch, Sump, & Little, 2010). CAP offered a conference for OTs/PTs/Extension Agents, but it was canceled due to low pre-registration.

Results

75% (18/24 ranchers) and 93% (25/27 professionals) reported improved behaviors.

4. Associated Knowledge Areas

KA Code	Knowledge Area
723	Hazards to Human Health and Safety
801	Individual and Family Resource Management
802	Human Development and Family Well-Being
805	Community Institutions, Health, and Social Services

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Economy
- Appropriations changes
- Public Policy changes
- Competing Public priorities
- Competing Programmatic Challenges
- Populations changes (immigration, new cultural groupings, etc.)

Brief Explanation

- As economic conditions change, the audience's interest in improving their financial literacy may change.
- Appropriations at the federal, state, or county level may change the number of Extension Agents available to teach financial management.
- Public policy changes, such as the Credit Card Act, may change people's interest in financial literacy.

- Competing public priorities may influence Extension Agents as they determine the most important work to do in their communities.
- Competing Extension programmatic challenges are a significant factor FCS agents' ability to do financial education programming as most of the Work Team members carry (at least) dual responsibilities such as FCS and 4-H, FCS and County Director, or other arrangements.

V(I). Planned Program (Evaluation Studies and Data Collection)

Evaluation Results

Participants evaluated report very high levels of increase in knowledge (95%), intent to change a behavior (92%), and actual behavior change/use of skills (74%) after Family Economic Stability programming.

Key Items of Evaluation

Individuals and families who learn how to avoid financial distress are better able to own homes and pay taxes instead of needing public assistance. They are better able to contribute to philanthropic causes and their community rather than struggle with bankruptcy or home foreclosure. They are better prepared to be self-sustaining and meet their goals of education, retirement, long-term care, etc.

V(A). Planned Program (Summary)

Program # 4

1. Name of the Planned Program

Animal Production Systems

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
301	Reproductive Performance of Animals	0%		10%	
302	Nutrient Utilization in Animals	5%		10%	
303	Genetic Improvement of Animals	4%		20%	
305	Animal Physiological Processes	4%		0%	
307	Animal Management Systems	60%		30%	
308	Improved Animal Products (Before Harvest)	2%		0%	
311	Animal Diseases	0%		10%	
315	Animal Welfare/Well-Being and Protection	7%		10%	
601	Economics of Agricultural Production and Farm Management	18%		10%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of professional FTE/SYs expended this Program

Year: 2010	Extension		Research	
	1862	1890	1862	1890
Plan	15.0	0.0	5.0	0.0
Actual	9.5	0.0	3.4	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
198704	0	222944	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
198704	0	222944	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
475594	0	3573244	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

- Workshops and educational classes for producers;
- Demonstration plots and field days to showcase the results;
- Individual counseling on producers specific problems;
- Conduct basic and applied research on livestock, primarily beef, dairy, sheep, and horses.

2. Brief description of the target audience

Individual agricultural producers, commodity groups, and agri-business partners

V(E). Planned Program (Outputs)

1. Standard output measures

2010	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	33511	72927	4297	0

2. Number of Patent Applications Submitted (Standard Research Output)

Patent Applications Submitted

Year: 2010

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2010	Extension	Research	Total
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Actual	16	66	82
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V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of attendees at workshops/trainings/field days

Year	Actual
2010	14788

Output #2

Output Measure

- Amount of grant dollars garnered to support animal research and outreach programs

Year	Actual
2010	146456

Output #3

Output Measure

- Number of technical and refereed journal articles published

Year	Actual
2010	16

Output #4

Output Measure

- Number of workshops presented.

Year	Actual
2010	275

Output #5

Output Measure

- Number of volunteers supporting this work

Year	Actual
2010	252

Output #6

Output Measure

- New technologies adopted by producers.

Year	Actual
2010	4

Output #7

Output Measure

- Number of agencies partnering in this program effort.

Year	Actual
2010	40

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Percent of participants in workshops/trainings/field days indicating an increase in knowledge gained
2	Percent of participants indicating change in behavior/ best practices adopted
3	Economic impact of the change in behavior reported
4	Students/Graduates in Integrated Resource Management Master's Degree Program
5	Animal Decision Support Systems

Outcome #1

1. Outcome Measures

Percent of participants in workshops/trainings/field days indicating an increase in knowledge gained

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	60	99

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

There are currently two circumstances for farmers and ranchers in Colorado that are determining the Agriculture Business Management (ABM) Team's focus.

1. Colorado has experienced dramatic demographic and economic transformations during the past decade. The make-up of farm operators has changed significantly, and enterprises increasingly face greater production, financial, marketing, human, and institutional risks.

2. Colorado producers are facing a time of great financial uncertainty. For some commodities, market prices are below production costs -- specifically dairy, cattle feeding, and swine. Prices for input, especially petro-based inputs, are increasing. Expected high interest rates and inflation will cause further pressure on profitability in agriculture and force farm and ranch managers to be increasingly more vigilant about their finances and to consider new management and investment strategies.

What has been done

Programming efforts increase the sustainability of farms and ranches and improve management skills. Also, efforts cause farm and ranch families to improve communications about business and family transfer issues (succession planning).

Results

99% of participants surveyed reported they had gained knowledge in topics including: Financial Statements, Costs of Production, Sources of Risk/Risk Tolerances, Business/Family Goals, Alternative Management Strategies, Insurance Products, Legacy & Succession Planning, and/or Agricultural Records.

4. Associated Knowledge Areas

KA Code	Knowledge Area
302	Nutrient Utilization in Animals
303	Genetic Improvement of Animals
307	Animal Management Systems
315	Animal Welfare/Well-Being and Protection
601	Economics of Agricultural Production and Farm Management

Outcome #2

1. Outcome Measures

Percent of participants indicating change in behavior/ best practices adopted

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	50	76

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Colorado ranks 5th in the nation for value of cattle and calves (\$3.2 billion) which is over half of the total market value of agricultural products sold in Colorado. There were 2.6 million cattle and calves in Colorado (beef and dairy) on January 1, 2009. The contribution from beef cattle is greater than three times that from grain, oilseeds, dry beans and dry peas (\$1.0 billion). According to the 2007 US Census of Agriculture, the numbers of farms in Colorado with beef cows decreased 6.4% from 1997 to 2007 and the number of farms with all cattle and calves decreased 28.1% during the same 10 year period. (Source: 2007 Census of Agriculture, State Data: Colorado)

What has been done

The CSU Beef Team efforts are focused on enhancing the continued economic contribution of the Colorado Beef Industry through educational programs, problem-solving research and communication of science-based information to producers and the consuming public. This will have a long-term impact on the social, economic, civic and environmental resources in Colorado.

Results

76% of participants surveyed indicated they had changed their behavior and/or taken action and/or used skills in relation to marketing, reproduction, nutrition, general management, animal handling, range management, health, monitoring of range lands, use of Quality Assurance (QA) protocols, assisting clientele in assuring healthy animals by proper vaccination/Beef Quality Assurance (BQA)/monitoring disease concerns as they arise, monitoring breeding success, and/or improving value of market animals.

4. Associated Knowledge Areas

KA Code	Knowledge Area
302	Nutrient Utilization in Animals
303	Genetic Improvement of Animals
307	Animal Management Systems
315	Animal Welfare/Well-Being and Protection
601	Economics of Agricultural Production and Farm Management

Outcome #3

1. Outcome Measures

Economic impact of the change in behavior reported

Not Reporting on this Outcome Measure

Outcome #4

1. Outcome Measures

Students/Graduates in Integrated Resource Management Master's Degree Program

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Faculty of the Western Center for Integrated Resource Management interviewed current and former graduate students and agricultural professionals including ranch and wildlife managers and extension service personnel regarding the needs of these communities. Responses from these groups identified weaknesses in the educational approach including lack of depth in many outreach presentations and a lack of meaningful, accessible online educational materials. The lack of an interdisciplinary education was also seen as a major problem.

What has been done

In meetings with producers, business leaders, and extension personnel it was clear that one to two hour presentations on specific topics were unsatisfactory and that in-depth information in areas such as alternative enterprises, grazing management, livestock selection and evaluation, risk management, building a business, financial management, marketing, herd health, intergenerational transfer of assets, etc. was desired. Therefore, we focused on initially developing and continually revising the modules needed to prepare managers of land-based enterprises and are currently teaching our eighth class of full-time graduate students (108 total).

Results

Master's degree program suggests that less than 20% of the material is region specific. The principles of ecology, water cycles, carbon cycles, nutrition, reproduction, genetics, business development and management, etc. are similar throughout the United States. However, grazing management, animal selection and management, wildlife opportunities, marketing strategies and some human resource issues, etc. are often location specific. The Adobe Connect technology used allows easy modification of any class to address specific regional issues. This model of agriculture education is adaptable to other institutions and countries. For example, the 28 universities that are involved in the AG*IDEA consortium have agreed to accept all 11 courses for their program. The consortium agrees that the integrated courses are needed and will be utilized by students from all 28 universities.

4. Associated Knowledge Areas

KA Code	Knowledge Area
307	Animal Management Systems
601	Economics of Agricultural Production and Farm Management

Outcome #5

1. Outcome Measures

Animal Decision Support Systems

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The beef cattle selection decision support system is intended for use by beef cattle producers to simplify selection and purchase of breeding animals by evaluating potential replacement animals on expected profitability of their offspring. This system of development is predicated on complaints by many breeders who felt overwhelmed by amount of information available on animals with which to make selection decisions. This information often includes pedigree information, actual performance, and a multitude of expected progeny differences for many different traits.

What has been done

Over the past 2 years, a complete recoding of the decision support system has been underway and has been based on feedback from members of breed associations participating in the system. An accounting system was included at the request of breeders. A new interface for updating EPDs from participating breed associations has been developed and tested. We have received permission from several large individual seedstock breeders to use animal performance and genetic information to parameterize a base population of breeding animals. Commercial level performance parameters have been gathered from the National Animal Health Monitoring System.

Results

While the final, upgraded system has not been released to the general public, improvements and additions to the decision support model are ongoing. We anticipate release of the system in spring 2011. The users of the system represent multiple breeds and their respective associations. Obtaining EPDs from these organizations is critical to the success and uptake of the methodology. Additionally these associations provide a mechanism for delivery of the technology to users through links on their websites. This system has the potential to have a large influence on profitability of beef production. If bulls are used for 3 breeding seasons with an average of 25 offspring produced per season, each of these 10,000 bulls would produce a total of 75 offspring. If the system yields only an average of \$10 more profit per progeny produced, the economic result for participating associations and breeders would be approximately \$7 million in profit.

4. Associated Knowledge Areas

KA Code Knowledge Area

307	Animal Management Systems
601	Economics of Agricultural Production and Farm Management

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Appropriations changes
- Public Policy changes
- Government Regulations
- Competing Programmatic Challenges

Brief Explanation

The external factors marked above could cause changes in programming and the time Extension Agents and Specialists could devote to any one specific program or topic.

- A natural disaster, such as drought, would require additional programming to provide the education and information producers would need for their businesses to survive.
- Decreases in appropriated budgets , county and/or state, would likely force agents to alter their work on animal production issues.
- Members of the Beef Team, Small Ruminant, and/or Agriculture Business Management would tailor the topics presented in workshops, change educational programming, and/or develop new or different technologies and strategies for animal producers if there were changes in government regulations.

V(I). Planned Program (Evaluation Studies and Data Collection)

Evaluation Results

Adoption of improved and productive and sustainable agricultural systems will help assure that animal producers will continue and individuals, families, and communities have a safe and sufficient food supply.

Key Items of Evaluation

The work of the NIFA priority are Global Food Security and Hunger of necessity includes animal and plant production systems and integrates Extension education in disseminating research results. Colorad

Results from the experimental water market suggest that while the introduction of active water leasing markets will result in more water in agriculture, it may make irrigators worse off. This is especially the case if information about past transactions is not publicly available. These results directly address questions/concerns raised by irrigators about participating in water leasing at the start of the project. These results were communicated to state officials, who indicated they will incorporate these findings into future discussions regarding the design of alternative institutions. The results provide insight into why many in irrigated agriculture are reluctant to participate in alternatives to

traditional water rights transfers. The water market program was also used as a learning tool on several different occasions to help students, irrigators, and state officials better understand how water markets work and the decision process for those involved. Evidence of the impact of the learning exercise includes: comments from one participant who indicated that it contributed to a change in their thinking about whether or not to sell their water rights and student course evaluations which indicated it changed their thinking about the reallocation of water using markets. In terms of research, the results have provided new insight into how water rights and water leasing markets interact.

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- Translate basic research and conduct applied research in animal and plant production systems;
- Deliver workshops and educational classes for producers;
- Communicate results through demonstration plots and field days;
- Provide individual counseling for producers and clientele on specific animal and plant production problems.

V(A). Planned Program (Summary)

Program # 5

1. Name of the Planned Program

Plant Production Systems

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
201	Plant Genome, Genetics, and Genetic Mechanisms	0%		10%	
202	Plant Genetic Resources	4%		0%	
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants	3%		10%	
205	Plant Management Systems	54%		20%	
206	Basic Plant Biology	9%		10%	
211	Insects, Mites, and Other Arthropods Affecting Plants	6%		10%	
212	Pathogens and Nematodes Affecting Plants	0%		10%	
213	Weeds Affecting Plants	10%		10%	
214	Vertebrates, Mollusks, and Other Pests Affecting Plants	1%		0%	
215	Biological Control of Pests Affecting Plants	1%		10%	
216	Integrated Pest Management Systems	12%		10%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of professional FTE/SYs expended this Program

Year: 2010	Extension		Research	
	1862	1890	1862	1890
Plan	15.0	0.0	26.0	0.0
Actual	17.7	0.0	18.5	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
368850	0	1355064	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
368850	0	1355064	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
882834	0	8247783	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

- Conduct basic and applied research in plant production systems;
- Provide workshops and educational classes for producers;
- Utilize demonstration plots and field days to communicate program results;
- Use individual counseling with producers and clientele on specific plant production problems.

2. Brief description of the target audience

Individual agricultural producers, homeowners, agribusinesses, and commodity organizations.

V(E). Planned Program (Outputs)

1. Standard output measures

2010	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	64041	276220	557	0

2. Number of Patent Applications Submitted (Standard Research Output)

Patent Applications Submitted

Year: 2010

Actual: 2

Patents listed

Plant Variety Protection - Wheat variety Snowmass
 Plant Variety Protection - Potato Variety Rio Grande Russet

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2010	Extension	Research	Total
Actual	37	206	243

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Release of technologies adopted by growers such as crop cultivars, crop germplasm, or components of crop production systems.

Year	Actual
2010	29

Output #2

Output Measure

- Number of attendees at workshops/trainings/field days.

Year	Actual
2010	14986

Output #3

Output Measure

- Amount of grant dollars garnered to support natural plant production systems research and outreach.

Year	Actual
2010	1648007

Output #4

Output Measure

- Technical publications in the topical area of plant production systems.

Year	Actual
2010	37

Output #5

Output Measure

- Number of basic and applied research efforts in plant production systems: Number of workshops, educational classes for producers Number of demonstration plots and field days
Number of individual consultations

Year	Actual
2010	0

Output #6

Output Measure

- Number of Extension workshops focusing on plant production systems.

Year	Actual
2010	537

Output #7

Output Measure

- Number of volunteers supporting plant production systems work.

Year	Actual
2010	671

Output #8

Output Measure

- Number of newsletters distributed in support of this plan of work.

Year	Actual
2010	79

Output #9

Output Measure

- Number of agencies partnering in this work.

Year	Actual
2010	89

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Percent of participants at workshops/trainings/field days indicating an increase in knowledge gained.
2	Percent of participants indicating change in behavior/best practices adopted.
3	Economic impact of the change in behavior reported.
4	Adoption of crop production technology as measured by agricultural statistics.
5	Adoption of improved wheat cultivars.
6	Potential of living mulches to decrease soil erosion.
7	Determining Consumptive Water Use in Crops by Direct Measurement of ET
8	Advances in the Development of Wheat Cultivars and Germplasm
9	Advances in Development of Potato Cultivars
10	Adoption of Herbaceous and Woody Plant Species in the Rocky Mountain and High Plains Region
11	Fruit and Vegetable Production Practices to Improve Returns to Growers
12	Improving Acceptance of Certified Potato Cultivars
13	Ecology, Biology and Management of Invasive Weeds in Colorado
14	Ecology of Pests and Pest Management Systems

Outcome #1

1. Outcome Measures

Percent of participants at workshops/trainings/field days indicating an increase in knowledge gained.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	50	87

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Wheat research and Extension activities contribute significantly to the profitability and sustainability of wheat production in Colorado, which is a key component of the state's rural economy.

What has been done

1. Conduct, report and disseminate the results of the Colorado wheat variety trials.
2. Conduct, report and disseminate the results of the Colorado On-Farm Collaborative Tests (COFT).
3. Survey variety trial cooperators, COFT cooperators, and other key members of the Colorado wheat industry regarding the value of these tests, potential test improvements, and other issues that should be addressed by the Wheat Team.

Results

87% of participants surveyed reported knowledge gained in wheat best management practices and/or crop production strategies.

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants
213	Weeds Affecting Plants
215	Biological Control of Pests Affecting Plants

216 Integrated Pest Management Systems

Outcome #2

1. Outcome Measures

Percent of participants indicating change in behavior/best practices adopted.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	50	64

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Wheat research and Extension activities contribute significantly to the profitability and sustainability of wheat production in Colorado, which is a key component of the state's rural economy.

What has been done

1. Conduct, report and disseminate the results of the Colorado Wheat Variety Trials (COFT).
2. Conduct, report and disseminate the results of the Colorado On-Farm Collaborative Tests.
3. Survey variety trial cooperators, COFT cooperators, and other key members of the Colorado wheat industry regarding the value of these tests, potential test improvements, and other issues that should be addressed by the Wheat Team.

Results

63.9% of surveyed farmers are using a multi crop, wheat based cropping system. Additionally, the following indicators provide evidence that farmers are protecting soil health and the environmental quality of farms and surrounding agricultural areas:
 74% of survey respondents are using conservation tillage or no-till farming practices
 76% of survey respondents use herbicides for weed control every year. The remainder use another form of integrated weed management
 70.3% of survey respondents are managing insects on an economic threshold basis.
 52.9% of survey respondents manage wheat diseases when conditions justify pesticides.
 34.2% of survey respondents apply phosphorus and 39.8% apply potassium and/or micronutrient

4. Associated Knowledge Areas

KA Code	Knowledge Area
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants
213	Weeds Affecting Plants
215	Biological Control of Pests Affecting Plants
216	Integrated Pest Management Systems

Outcome #3

1. Outcome Measures

Economic impact of the change in behavior reported.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	450000	12000000

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Wheat research and Extension activities contribute significantly to the profitability and sustainability of wheat production in Colorado, which is a key component of the state's rural economy.

What has been done

1. Conduct, report and disseminate the results of the Colorado wheat variety trials.
2. Conduct, report and disseminate the results of the Colorado On-Farm Collaborative Tests (COFT).
3. Survey variety trial cooperators, COFT cooperators, and other key members of the Colorado wheat industry regarding the value of these tests, potential test improvements, and other issues that should be addressed by the Wheat Team.

Results

Wheat farmers benefiting from CSU's efforts are equal to \$26,500/farm or \$12 million for all of Colorado's wheat producers each year.

4. Associated Knowledge Areas

KA Code	Knowledge Area
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
205	Plant Management Systems
206	Basic Plant Biology
211	Insects, Mites, and Other Arthropods Affecting Plants
213	Weeds Affecting Plants
215	Biological Control of Pests Affecting Plants
216	Integrated Pest Management Systems

Outcome #4

1. Outcome Measures

Adoption of crop production technology as measured by agricultural statistics.

Not Reporting on this Outcome Measure

Outcome #5

1. Outcome Measures

Adoption of improved wheat cultivars.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	0	95

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Wheat research and Extension activities contribute significantly to the profitability and sustainability of wheat production in Colorado, which is a key component of the state's rural economy.

What has been done

1. Conduct, report and disseminate the results of the Colorado Wheat Variety Trials.
2. Conduct, report and disseminate the results of the Colorado On-Farm Collaborative Tests (COFT).
3. Survey variety trial cooperators, COFT cooperators, and other key members of the Colorado wheat industry regarding the value of these tests, potential test improvements, and other issues that should be addressed by the Wheat Team.

Results

The following indicators provide evidence that farmers are protecting soil health and the environmental quality of farms and surrounding agricultural areas:

- 1.74% of survey respondents are using conservation tillage or no-till farming practices
- 2.76% of survey respondents use herbicides for weed control every year. The remainder use another form of integrated weed management
- 3.70.3% of survey respondents are managing insects on an economic threshold basis.
- 4.52.9% of survey respondents manage wheat diseases when conditions justify pesticides.
- 5.34.2% of survey respondents apply phosphorus and 39.8% apply potassium and/or micronutrients only when needed.

4. Associated Knowledge Areas

KA Code	Knowledge Area
202	Plant Genetic Resources
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
205	Plant Management Systems
206	Basic Plant Biology
211	Insects, Mites, and Other Arthropods Affecting Plants
213	Weeds Affecting Plants

Outcome #6

1. Outcome Measures

Potential of living mulches to decrease soil erosion.

Not Reporting on this Outcome Measure

Outcome #7

1. Outcome Measures

Determining Consumptive Water Use in Crops by Direct Measurement of ET

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Accurate determination of crop evapo-transpiration (ET) is essential in farm irrigation management and administration of water rights in entire river basins of Colorado. Resolution of the Colorado/Kansas water dispute in particular, is dependent on accurate ET determination in the Arkansas River Valley in Colorado.

What has been done

Direct measurements of alfalfa ET were obtained during 4 harvest cycles in 2010 from a precision weighing lysimeter in the Arkansas River Valley of Colorado. Irrigation, crop growth, and soil water balance data from 3 corn fields and 1 alfalfa field in Eastern Colorado were collected. The data from these fields were used in preliminary testing of a spreadsheet-based irrigation scheduling tool that uses daily estimates of crop ET and soil water content to determine the timing and amount of irrigation. One fact sheet describing the water balance approach of irrigation scheduling was also written.

Results

: Data from the 2008 and 2009 alfalfa growing seasons were analyzed and presented to various water professionals in Colorado. This resulted in 215 individuals learning about how crop coefficients are developed and how they can be used with ASCE standardized reference ET to estimate the ET of different crops. Alfalfa crop coefficient curves for 4 cutting cycles were developed. These locally developed curves can be used with reference ET calculated from the ASCE standardized equation that is being widely adopted in Colorado.

4. Associated Knowledge Areas

KA Code **Knowledge Area**
205 Plant Management Systems

Outcome #8

1. Outcome Measures

Advances in the Development of Wheat Cultivars and Germplasm

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The objectives of the wheat breeding project are to a) develop wheat cultivars and germplasm having desirable agronomic, disease and insect resistance, and end-use quality characteristics and b) conduct research to improve understanding of genetic and environmental factors that affect wheat yield and end-use quality in Colorado. Development of improved wheat cultivars serves the wheat industry in Colorado by reducing wheat production costs, reducing pesticide use, and providing improved marketing options.

What has been done

In fall 2010, three hard red winter wheat (HRW) experimental lines were advanced for Foundation seed production to enable release as new cultivars in fall 2011. All three lines have shown excellent yield and test weight in field trials and good stripe rust resistance. Two of the lines have excellent milling and baking quality. Several other lines under breeder seed increase in 2010 were retained for testing and possible release. To address various pest and production constraints, diverse germplasm sources continue to be used in the crossing program. These include several sources of resistance to wheat rusts, Russian wheat aphid biotype 2, wheat streak mosaic and Triticum mosaic viruses.

Results

Since inception of the program in 1963, the CSU Wheat Breeding Program has released over 29 improved wheat cultivars. CSU-bred wheat cultivars account for over 60% (or 72% of the accounted-for acreage) of Colorado's 2.45 million acres (2010 crop) with the remaining acreage planted mostly with cultivars from university breeding programs in adjacent states. Since inception of the program, average wheat grain yields in Colorado have more than doubled with at least 50%

of this increase attributed to improved cultivars. While the value of these yield increases varies according to market prices, estimates of economic returns from two of our most widely grown releases (Hatcher and Ripper) are approximately \$32.3 million for the 2010 crop alone (estimated \$21.9 million for yield improvement and \$10.3 million for quality improvement). As a whole, estimates from Colorado wheat industry leaders on CSU-developed quality improvements suggest that end-use quality enhancements from cultivars developed at CSU provide an average of \$17.5 million per year increased income for Colorado wheat producers (70 million bushels average x \$0.25 per bushel price increase; 2010 dollars).

4. Associated Knowledge Areas

KA Code	Knowledge Area
202	Plant Genetic Resources
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Pathogens and Nematodes Affecting Plants

Outcome #9

1. Outcome Measures

Advances in Development of Potato Cultivars

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The major objectives of the Colorado Potato Breeding and Selection Program are: (1) to develop new potato cultivars (russets, reds, chippers, and specialties) with increased yield, improved quality, improved nutritional characteristics, resistance to diseases and pests, and tolerance to environmental stresses; (2) to collaborate with growers, shippers, processors, and research personnel to assess the production, adaptability, marketability, and other characteristics of advanced selections from the Colorado program; (3) to provide a basic seed source of selections to growers for seed increase and commercial testing; (4) to evaluate promising selections for potential seed export (interstate and international).

What has been done

Fifty-five advanced selections were saved and will be increased in 2011 pending results of ongoing evaluations. Advanced selections evaluated in the Southwest Regional Trials, Western Regional Trials, or by Colorado producers in 2010, included 6 russets, 2 reds, 9 chippers, and 8 specialties. Consideration is being given to releasing CO95051-7W. This round white selection has excellent chip color after long term storage. Plant Variety Protection was granted to Rio Grande Russet in 2010.

Results

: Since 1975, there have been 27 potato cultivars/clonal selections released by Colorado State University or in cooperation with other agencies. Colorado State University releases accounted for 59% of the 55,500 acres planted to fall potatoes in Colorado in 2010. Colorado cultivars and clonal selections accounted for 44% of the 12,053 acres of Colorado certified seed accepted for certification in 2010. Advanced Colorado selections accounted for another 1% of the seed acreage. Three of the top 10 russet cultivars grown for seed in the U.S. [Canela Russet (#7), Rio Grande Russet (#8), Russet Norkotah-S3 (#9) in 2009] were developed by the Colorado program. Also for reds Sangre-S11 ranked #7. For colored-fleshed specialties, Mountain Rose and Purple Majesty both ranked #1 among red- and purple-fleshed cultivars.

4. Associated Knowledge Areas

KA Code	Knowledge Area
202	Plant Genetic Resources
205	Plant Management Systems

Outcome #10

1. Outcome Measures

Adoption of Herbaceous and Woody Plant Species in the Rocky Mountain and High Plains Region

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

: Select, introduce and evaluate herbaceous annuals, herbaceous perennials and woody plant material for growing in the Rocky Mountain and High Plains Region including Plant Select and native plant material

What has been done

Woody (64 taxa) and herbaceous plant (52 taxa) were acquired in 2010 for evaluation. Performance records for 3140 taxa of woody and herbaceous plants were entered into a computer system, which are available on three websites. Approximately 1100 varieties of annual flowers and 80 varieties of herbaceous perennials were evaluated in 2010. In 2010, seven plant species were recommended or introduced by Plant Select. A project determining herbaceous plant species and media suitable to support green roofs in a semi-arid area was completed. A performance report for annuals (summer and winter) and perennial trials was published and sent to all cooperators and industry personnel in the state and region.

Results

Specific performance results from these annual, perennial and woody plant trials help determine which new and superior annual and perennial varieties growers throughout the state and region should grow and market. In 2010, over 1.5 million Plant Select plants were sold and over one million people visited the 70 plus demonstration gardens. Many seed and vegetatively propagated varieties including coleus, New Guinea impatiens, pennisetums, spreading petunias and rudbeckias have become important bedding plant crops in the state. Plant Select plants, which are either introductions or recommendations throughout the state and region, means marketing more profitable plants for growers and retailers throughout state and region. Knowledge of exact water requirements of various mesic shrub species will provide property managers and homeowners monetary savings by ultimately conserving water use. Green roofs have been shown to manage storm water, mitigate urban heat island effect and reducing air and noise pollution along with adding esthetics to urban landscapes. Various plant species and growing media can now be recommended for green roofs in a semi arid region.

4. Associated Knowledge Areas

KA Code	Knowledge Area
202	Plant Genetic Resources
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
205	Plant Management Systems
213	Weeds Affecting Plants

Outcome #11

1. Outcome Measures

Fruit and Vegetable Production Practices to Improve Returns to Growers

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The Arkansas Valley has a long and successful history of vegetable seed production and at one time, provided a significant portion of the cucurbit seeds used in the United States. Although seed production has diminished from its historically high level, there is still a sizable amount of conventional seed production in the Valley. There has been a dramatic increase in organic vegetable production. As a result, demand for organic vegetable seed is growing rapidly as the USDA National Organic Program requires organic farmers to use certified organic seed when available. With this potential, there is an opportunity to re-establish the seed production industry in the Arkansas Valley.

What has been done

In 2010, a study was conducted to characterize the fresh market and seed yield response of organically-grown watermelon (Crimson Sweet) to different mulching methods. The methods were bare ground, straw mulch, and black plastic mulch. All treatments were irrigated via drip lines placed under the production bed at a depth of 3 inches. Total marketable fruit yields and seed yields were significantly higher for watermelon grown with black plastic mulch than with straw mulch or with bare ground. The straw mulch treatment had higher fresh fruit yield and seed yield than bare ground but that difference was not significant (lsd=0.1). Relative to the other treatments, weeds were easier to control in the plastic mulch treatment.

Results

Gross returns without plasticulture average \$3000 per acre. With plasticulture, gross returns reach \$6000 per acre with approximately \$200 additional cost for plastic or a net marginal income increase of \$2800 per acre.

4. Associated Knowledge Areas

KA Code	Knowledge Area
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
205	Plant Management Systems

Outcome #12

1. Outcome Measures

Improving Acceptance of Certified Potato Cultivars

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Potato Virus Y (PVY) continues to be an ongoing disease threat to the Colorado potato industry. This disease has continued to be epidemic in certain cultivars such as Russet Norkotah and Shepody. Producers, especially certified seed producers, have been having severe difficulties in keeping seed in the certification program because of PVY infection. Additionally, commercial producers have seen a drop in overall yield of larger tubers due to virus infection

What has been done

: Ongoing projects have helped in understanding the way the virus moves between fields and how this movement might be controlled. Growers have been utilizing the findings from these projects to help reduce the overall impact from PVY. During the year, the 'Certified Seed Potato Act' was made law. As a co-author of this legislation, it is expected that significant control of PVY as well as other diseases may be forthcoming due to the planting of all certified seed or at least fully tested seed sources. A poster was presented at the annual National Potato Council Potato Expo as well.

Results

: Potato growers in Colorado continued, in 2010, to demonstrate significant changes in their production of the most susceptible cultivars, especially Russet Norkotah. This change helped them pass a higher percentage of certified seed than in 2010 because the newer russet cultivars demonstrated less issues with PVY. Additionally, efforts in both demonstration type on-farm projects and during grower meetings resulted in behavioral changes by producers in how they produce the most susceptible cultivars which also reduced loss of seed acreage due to disease issues.

4. Associated Knowledge Areas

KA Code	Knowledge Area
202	Plant Genetic Resources
206	Basic Plant Biology
212	Pathogens and Nematodes Affecting Plants
216	Integrated Pest Management Systems

Outcome #13

1. Outcome Measures

Ecology, Biology and Management of Invasive Weeds in Colorado

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

: Yellow toadflax is a creeping perennial weed that is noxious in Colorado and very problematic in the Intermountain West. It is very difficult to control and in our experiments to date, acceptable control was not achieved 1 year after treatments (YAT) were applied and site to site variation has been extreme.

What has been done

Identical experiments were established at 5 sites in 2008 as part of a series of experiments to determine whether site to site variation is genetically or environmentally based. Treatments included chlorsulfuron at 53, 88, and 105 g ai/ha, imazapyr at 140, 280, and 420 g ai/ha, and a non-treated control plot. In 2010, 2 YAT biomass data were collected and yellow toadflax control remained acceptable at 3 of the 5 sites at the 2 highest rates of both herbicides. Control varied with location and unlike in 2009, the site effect was no longer eliminated at the highest rate of either herbicide, which appears to be driven by the 2 low elevation sites. The high rates of control 2 YAT at 3 sites and control breaking down at the 2 low elevation sites strongly suggests that the site to site variation that we have historically observed is environmentally based and not inherited. Enzyme assays also showed no herbicide resistance among the accessions further indicating that the variation is associated with environmental differences among sites.

Results

The spatial variation associated with using herbicides to control yellow toadflax appears to be environmentally related rather than associated with inheritance. While imazapyr is not a standard recommendation because of limited selectivity, chlorsulfuron is a common recommendation and the site variation vanished at the 2 highest rates in 2010 albeit, control was only commercially acceptable at 3 of 5 sites. Imazapyr, however, is used by public land managers to control yellow toadflax near water and clearly, the 280 and 420 g ai/ha eliminated site variation. Chlorsulfuron at 88 g ai/ha will remain a common recommendation to control yellow toadflax in Colorado. This

information will be shared with public land managers and private land owners in Colorado. Some public land managers in particular have been using tank mixes with three to four different herbicides to control yellow toadflax and our results demonstrate that populations of this troublesome invasive weed can be decreased effectively by using less total herbicide. Adoption of our results also will decrease injury to desirable forbs and shrubs by using less herbicide, which should lessen re-invasion potential by the same or other weedy forbs.

4. Associated Knowledge Areas

KA Code	Knowledge Area
213	Weeds Affecting Plants

Outcome #14

1. Outcome Measures

Ecology of Pests and Pest Management Systems

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Arthropods are important food sources in terrestrial food webs, and understanding what influences patterns of diversity and abundance of these species is essential for developing informed management practices in natural systems. Of particular importance is determining what impact non-native species such as tamarisk have on arthropod abundance and diversity, and what impact control strategies for tamarisk (such as biological control) have on food web structure.

What has been done

: In 2010, scientists and managers from the National Park Service, State and County agencies, scientists from the Entomological Society of America, students from Colorado State University all received information on the impact of toadflax and tamarisk biological control on target and non-target species. Results from this project were published in one peer reviewed journal article and three management handbook chapters.

Results

Transmittal of this knowledge has led to a change in conditions, informing scientists and resource managers of the target and non-target impacts of biological control systems of toadflax, tamarisk and other weeds. Increased knowledge of these impacts will allow policy makers and resource managers to make more informed decisions on invasive plant management and biological control strategies.

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants
213	Weeds Affecting Plants
215	Biological Control of Pests Affecting Plants

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Appropriations changes
- Public Policy changes
- Government Regulations
- Competing Programmatic Challenges

Brief Explanation

The external factors marked above would cause changes in programming and the time Extension Agents and Specialists could devote to any specific program or topic. A natural disaster, such as drought, would require additional programming to provide the education and information producers would need for their businesses to survive. Decreases in appropriated budgets, county and/or state, would likely force agents to alter their work on cropping issues. Members of the Work Teams associated with Plant Production Systems would tailor the topics presented in workshops, change educational programming, and/or develop new or different technologies and strategies for crop producers if there were changes in government regulations.

V(I). Planned Program (Evaluation Studies and Data Collection)

Evaluation Results

- 95% of Colorado wheat farmers surveyed are convinced that they have benefited from CSU developed wheat varieties and Extension education efforts equal to \$22.50/acre.
- Wheat farmers benefiting from CSU's efforts is equal to \$26,500/farm or \$12 million for all of Colorado's wheat producers each year.

Key Items of Evaluation

The work of the NIFA priority area 'Global Food Security and Hunger' of necessity includes both animal and plant production systems and integrates Extension education in disseminating research results.

- Translate basic research and conduct applied research in animal and plant production systems;
- Deliver workshops and educational classes for producers;
- Communicate results through demonstration plots and field days;
- Provide individual counseling for producers and clientele on specific animal and plant production problems.

V(A). Planned Program (Summary)

Program # 6

1. Name of the Planned Program

Natural Resources and Environment

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
101	Appraisal of Soil Resources	1%		10%	
102	Soil, Plant, Water, Nutrient Relationships	27%		10%	
103	Management of Saline and Sodic Soils and Salinity	1%		10%	
104	Protect Soil from Harmful Effects of Natural Elements	1%		0%	
111	Conservation and Efficient Use of Water	17%		20%	
112	Watershed Protection and Management	2%		10%	
121	Management of Range Resources	18%		10%	
122	Management and Control of Forest and Range Fires	1%		0%	
123	Management and Sustainability of Forest Resources	7%		10%	
131	Alternative Uses of Land	15%		0%	
132	Weather and Climate	0%		10%	
133	Pollution Prevention and Mitigation	3%		0%	
134	Outdoor Recreation	1%		0%	
136	Conservation of Biological Diversity	6%		0%	
403	Waste Disposal, Recycling, and Reuse	0%		10%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of professional FTE/SYs expended this Program

Year: 2010	Extension		Research	
	1862	1890	1862	1890
Plan	25.0	0.0	11.0	0.0
Actual	24.7	0.0	17.9	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
516624	0	711985	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
516624	0	711985	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
1236528	0	10686430	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

- Conduct workshops and educational classes for producers, landowners, and agency personnel;
- Establish demonstration plots and field days to share research and outreach results;
- Consult with individual producers and landowners to address local problems;
- Conduct basic and applied research on environmental and natural resources issues.

2. Brief description of the target audience

Individual agricultural producers, landowners, homeowners, commodity groups, regulatory agencies, agribusinesses, and local, state, and federal land management agencies.

V(E). Planned Program (Outputs)

1. Standard output measures

2010	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	98621	42704	4053	0

2. Number of Patent Applications Submitted (Standard Research Output)

Patent Applications Submitted

Year: 2010

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2010	Extension	Research	Total
Actual	45	91	136

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of attendees at workshops/trainings/field days.

Year	Actual
2010	26783

Output #2

Output Measure

- Amount of grant dollars garnered to support natural resources research and outreach.

Year	Actual
2010	695964

Output #3

Output Measure

- Number of technical and refereed journal articles published.

Year	Actual
2010	45

Output #4

Output Measure

- Number of Master Gardener and Wildlife Master volunteer hours

Year	Actual
2010	55900

Output #5

Output Measure

- Value of volunteer time at \$20/hr (nationally recognized value.)

Year	Actual
2010	1166000

Output #6

Output Measure

- Number of volunteers supporting this program.

Year	Actual
2010	1731

Output #7

Output Measure

- Number of partnering agencies supporting this program.

Year	Actual
2010	228

Output #8

Output Measure

- Number of new technologies adopted by producers.

Year	Actual
2010	2

Output #9

Output Measure

- Pounds of food donated to local food banks through Master Gardener efforts.

Year	Actual
2010	32300

Output #10

Output Measure

- Number of curriculum pieces developed and/or reviewed in support of this planned program.

Year	Actual
2010	14

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Percent of participants in workshops/trainings/field days indicating an increase in knowledge gained.
2	Percent of participants indicating change in behavior/best practices adopted.
3	Economic impact of the change in behavior reported.
4	Reducing cost of irrigation.
5	Impact of UV-B radiation on agriculture.
6	Small acreage management workshops.
7	Crop and Soil Management Systems in Water Limited Agroecosystems
8	Watershed-Scale Planning for Evaluation of Agricultural Conservation Practices
9	Effects of Irrigated Agriculture and Riparian Vegetation on Fish Habitats

Outcome #1

1. Outcome Measures

Percent of participants in workshops/trainings/field days indicating an increase in knowledge gained.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	60	59

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Pest infestations are serious issues endemic to SW Colorado and other areas. Impacts include loss of agricultural and horticultural production; decreasing property values and aesthetics; degradation of the environment and wildlife habitat; loss of desirable plants and native species; tourism impacts; and increasing economic costs of control and mitigation. Specific values and local and/or regional examples include firewood management to reduce pest movement that has become a major issue in North America.

What has been done

Team members monitor for and manage endemic and invasive pests that affect plants, animals and people in agricultural and non-agricultural sectors and economies of Colorado society. We have conducted research and delivered many presentations, and are helping with the State's firewood management plans. Workshops covered the topics of poisonous plants, insect pests, plant diseases, wildlife damage, and tamarisk management.

Results

59% of participants surveyed reported increased knowledge among the following topics:

- Pest Diagnosis;
- Pest Literacy;
- Pest Management Strategies;
- Improved Profitability with Timely Pest Management;
- IPM Strategies for Crop Systems & Pest Complexes.

4. Associated Knowledge Areas

KA Code	Knowledge Area
121	Management of Range Resources
123	Management and Sustainability of Forest Resources

Outcome #2

1. Outcome Measures

Percent of participants indicating change in behavior/best practices adopted.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	50	63

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Adequate supplies of clean water are essential to the health and well being of Colorado citizens, agriculture, industry, wildlife and the economic vitality of the state. Agriculture, industry, homeowners and agencies look to Colorado State University Extension to provide research-based information and educational programs on water quality, water quantity, water policy, and other water resource issues.

What has been done

Increasing the awareness and knowledge level of Colorado citizens so they can manage and adapt to the complex and challenging water issues in Colorado. The first step of this strategy is to provide training and resources for CSU Extension staff so they can conduct relevant educational programming that addresses real needs of their constituents. This step is consistent with strategies proposed by Smith and Waskom (2000), 'Key Strategy Elements:1.1 Provide for water education needs of Extension Agents and other CSU personnel involved in outreach programs.'

Results

63% of participants surveyed indicated they had changed behavior/use of skills in one or more of these areas:

Maintaining watershed health; Using deficit irrigation; Following IWM plans resulting in more efficient irrigation water use, greater reductions in salt, selenium, and/or nutrient loads to rivers in

affected areas, reduced nitrate and pesticide loads to groundwater, and more sustainably profitable operations; Beginning to use recommended strategies when farmland is de-watered.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
103	Management of Saline and Sodic Soils and Salinity
111	Conservation and Efficient Use of Water
131	Alternative Uses of Land

Outcome #3

1. Outcome Measures

Economic impact of the change in behavior reported.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	150000	1232027

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Sustainable landscapes use site-appropriate native plants and can reduce the need for water, maintenance time and pesticide use. Research demonstrates that landscapes including natives and adapted non-natives can reduce water usage by 60%. Native plants can also be beneficial because they are environmentally adapted, hardy, provide food and shelter for wildlife and maintain local biological diversity. However, many residents need education in selecting plants appropriate to their state's local environmental conditions such as water availability, soils and elevation.

Invasive, non-native weeds are a critical concern in many communities and threaten native ecosystems. Management of invasive weeds is critical when maintaining a natural space or a landscaped yard and garden. The United States spends \$137 billion per year in controlling weeds and mitigating damage. Noxious weeds are moving into valued ecosystems displacing natives at an alarming rate. Invasive species are a factor in the decline of 49% of all imperiled

species. Each year invasive species advance by 1.7 million acres and are found on 133 million acres across the country. In order to reduce cost and impact of invasive weeds, education is required.

What has been done

Educate the public about native plants in order to foster stewardship, sustainable landscaping and management of weeds that threaten native ecosystems.

Native Plant Master(r) courses offered in the field using living examples of the local flora.

Trainers teach identification of native and non-native plant species using dichotomous keys.

Trainers focus on sustainable landscape use of native plants and management strategies for invasive non-native plants.

Courses on public and private lands during spring, summer and fall.

Results

\$31,531 was saved by participants' planting of natives in a sustainable landscape (resulting from reduced landscape inputs such as watering, pruning, pest control etc.) \$1,200,497 was saved by alien weed control efforts (resulting from improved grazing, crop output, ornamental landscapes, wildlife habitat, tourism, etc.). The figures were acquired through an annual Student Voice Survey of past participants in Native Plant Master courses. The survey includes questions on what actions participants have taken as a result of their participation in the Native Plant Master program.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
111	Conservation and Efficient Use of Water
121	Management of Range Resources

Outcome #4

1. Outcome Measures

Reducing cost of irrigation.

Not Reporting on this Outcome Measure

Outcome #5

1. Outcome Measures

Impact of UV-B radiation on agriculture.

Not Reporting on this Outcome Measure

Outcome #6

1. Outcome Measures

Small acreage management workshops.

Not Reporting on this Outcome Measure

Outcome #7

1. Outcome Measures

Crop and Soil Management Systems in Water Limited Agroecosystems

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The purpose of this project is to advance understanding of water limited agroecosystems and develop sustainable management practices. The project is carried out in two major agroecosystems, dryland cropping systems and limited irrigation cropping systems in the semiarid Eastern Plains of Colorado. In dryland cropping, each unit of rainfall is so critical to production, that a practice that conserves an additional inch of water can be the difference between profit and loss.

What has been done

This project is developing dryland cropping systems that improve the capture and use of precipitation with long term ecological sustainability with field research locations at Fort Collins, Iloff, Sterling, Stratton, and Walsh. The studies emphasize intensified crop rotations in no-till based systems and have documented 50-70% annualized grain yield increases over conventional practices. We have reduced consumptive water use by 20-50% while maintaining a similar level on-farm income. In 2010, we statistically determined the CERES-Maize model accurately differentiates between full and limited irrigation corn production in northeastern Colorado in terms of evapotranspiration, crop growth, yield, water use efficiency.

Results

Intensive dryland cropping systems build soil organic carbon, improve soil quality, and improve both air and surface water quality because they provide high amounts of year around cover. These benefits have been realized for about 1,500,000 acres in CO that have been converted from wheat-fallow to wheat-summer crop-fallow. This conversion increased net return by \$22,275,000 per year under normal precipitation conditions. Limited irrigation cropping systems based on conservation tillage practices demonstrated in this project build soil organic carbon, improve soil quality, and improve both air and surface water quality because they provide high amounts of year around cover. These benefits have the potential to affect as much as 2,000,000 acres in CO. Survey results from this project document that irrigated farmers in the South Platte River Basin have a willingness to adopt limited irrigation cropping systems and that there will be adequate water savings to meet projected urban water demand through water lease arrangements.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
111	Conservation and Efficient Use of Water

Outcome #8

1. Outcome Measures

Watershed-Scale Planning for Evaluation of Agricultural Conservation Practices

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The primary goal of this project is to develop and demonstrate a new technology (the Conservation Impact Assessment Tool, CIAT) that can be used in market-based approaches to evaluate multiple effects (costs and water quality benefits) of commonly adopted agricultural conservation practices or best management practices (BMPs) at both field and watershed scales. The tool will be applicable to evaluate effects of practices to improve both water and soil resources and can be used to establish the basis for nutrient trading/accounting in agricultural watersheds.

What has been done

Several additional conservation practices were added in the tool to incorporate feedbacks from the stakeholder advisory group. Currently, the list of practices includes: crop rotation, field borders, grazing, nutrient management, pesticide management, residue/tillage management, terraces, ponds, wetlands, grassed waterways, filter/riparian strips, bank stabilization structures, grade stabilization structures, sedimentation basins, contour farming, and irrigation. Feedback from the user advisory group was incorporated to modify the input requirements, map production, and output generation components of the tool.

Results

The headwater basins of Colorado are heavily relied upon for freshwater resources on an annual basis. However, knowledge concerning both generation of such resources, and implications of climate change on their availability in the future, is lacking. Thus, this research has been undertaken to develop, calibrate, and test a comprehensive process-based model in four mountainous watersheds of Colorado, and investigate the potential impacts of changing climate on hydrologic response in these basins. Specifically, the Soil and Water Assessment Tool (SWAT) was utilized to develop watershed-specific hydrology models with high-resolution spatial data for the Cache la Poudre, Gunnison, San Juan and Yampa River basins. All study basins exhibited a decreasing ratio of precipitation to potential evapotranspiration for emissions scenario ensemble averages, which suggests Colorado basins will become more arid over the 21st century. Implications of this study are considerable, as management of water resources, both within the state and across the West, will be affected by freshwater availability in headwater basins of Colorado in the future.

4. Associated Knowledge Areas

KA Code	Knowledge Area
111	Conservation and Efficient Use of Water
112	Watershed Protection and Management

Outcome #9

1. Outcome Measures

Effects of Irrigated Agriculture and Riparian Vegetation on Fish Habitats

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

: Dwindling water resources for rivers and agricultural production have challenged many farmers across Colorado to meet the water needs for crop production while also trying to conserve decreasing water supplies. The Arikaree River, on the eastern plains of Colorado, is fed by the High Plains Aquifer and provides both unique habitat for the endangered fish species and irrigation water for agricultural production. Research has shown that the aquifer has been declining at approximately 0.25 m/year throughout the region and in some locations, it is dropping at 0.58 m/year based on farmer observations.

What has been done

: A water conservation survey was distributed to farmers in Eastern Colorado (predominately in Yuma County) to identify the top three conservation alternatives in each section. The water conservation sections were field practices, irrigation practices, management practices, programs, and conversion to less water consumptive crops. The water conservation savings model was developed from a comprehensive literature review of agricultural water conservation alternatives. A numerical water balance model of the alluvial aquifer-stream system was developed to link groundwater to pool depths in the Arikaree River.

Results

Results show that irrigation pumping causes a decline in the water table elevation which can be linearly approximated at about 0.25 m/yr. Long-term modeling was performed using the equations determined from the water balance and Darcy's Law. The calculations show that the river is at a critical point for preservation and could go dry in the next 8 to 12 years with no changes to the current pumping. This research shows that to maintain the current HPA water levels and alluvial aquifer, it would require 77% participation in the water conservation programs or reduction of at least 44.8 million cubic meters of irrigation pumping.

4. Associated Knowledge Areas

KA Code	Knowledge Area
111	Conservation and Efficient Use of Water
112	Watershed Protection and Management

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Appropriations changes
- Public Policy changes
- Government Regulations
- Competing Programmatic Challenges
- Populations changes (immigration, new cultural groupings, etc.)

Brief Explanation

- Weather conditions such as drought, flooding, hail, moisture/temperature trends influencing pathogen and pest life cycles, which will require short/medium/long term redirection of effort to accommodate program needs;
- Economic issues that may lead more individuals to acquire and/or redirect their IPM strategies according to resource limitations or opportunities;
- Continued funding through federal, state and county agencies;
- Changes by governmental and non-governmental agencies to irrigation and pest management requirements;
- Continued staffing of pest management Extension positions; and
- Continued increase in population of Colorado.

V(I). Planned Program (Evaluation Studies and Data Collection)

Evaluation Results

One measure of the impact of the Pest Management Work Team and BSPM IPM Program can be obtained by tracking changes in pest management practices and knowledge gained. For example, high correlation between changes in pesticide use and severity of pest problems would indicate practitioners have adopted sound pest management decision making. Periodic performance surveys of Extension agents, research scientists and BSPM IPM specialists are conducted to solicit input on effectiveness from statewide Extension faculty (via pre/post test instruments at meetings, clinics, field days), other clientele and commodity groups. Additional feedback will be obtained from stakeholders and administrators on IPM and individual specialist performance. Behavior change surveys have been developed and implemented to determine impact six months and a year after participant exposure to extension workshops. These survey instruments utilize email addresses of the participants and the Internet product Survey Monkey.

Key Items of Evaluation

The US Census of Agriculture reports decreasing numbers of mid- and large-sized farms and a significant increase in the number of small farms. Small acreage owners/operators frequently may not possess much agricultural or business knowledge. AES and Extension address the needs of small acreage producers and work with agricultural industry personnel and governmental agencies to assure that land managers and communities can evaluate a broad range of opportunities to enhance viability while respecting the environment.

V(A). Planned Program (Summary)

Program # 7

1. Name of the Planned Program

Community Resource Development

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
601	Economics of Agricultural Production and Farm Management	0%		40%	
602	Business Management, Finance, and Taxation	6%		0%	
604	Marketing and Distribution Practices	2%		0%	
605	Natural Resource and Environmental Economics	3%		30%	
607	Consumer Economics	6%		0%	
608	Community Resource Planning and Development	25%		20%	
610	Domestic Policy Analysis	3%		0%	
803	Sociological and Technological Change Affecting Individuals, Families, and Communities	29%		10%	
805	Community Institutions, Health, and Social Services	26%		0%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of professional FTE/SYs expended this Program

Year: 2010	Extension		Research	
	1862	1890	1862	1890
Plan	5.0	0.0	6.0	0.0
Actual	5.4	0.0	4.1	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
112790	0	258153	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
112790	0	258153	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
269960	0	892511	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

- Training for Extension personnel in community mobilization, facilitation, economic development.
- Work with rural communities on a regional approach to small town tourism including making optimal use of environmental resources, respecting the socio-cultural authenticity of host communities while conserving their built and living cultural heritage and traditional values, and ensuring viable, long-term economic operations, including stable employment and income-earning opportunities.
- Conduct basic and applied research in areas exploring the interface between agribusiness, rural development, and natural-resource-amenity-based opportunities.
- Conduct workshops and other educational activities with community stakeholders.

2. Brief description of the target audience

Community members, general public, consumers, and/or community organizations.

V(E). Planned Program (Outputs)

1. Standard output measures

2010	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	28957	51810	135	0

2. Number of Patent Applications Submitted (Standard Research Output)

Patent Applications Submitted

Year: 2010

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2010	Extension	Research	Total
Actual	11	23	34

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Training opportunities for community members

Year	Actual
2010	167

Output #2

Output Measure

- Technical publications related to economics, public policy, community development and related areas.

Year	Actual
2010	11

Output #3

Output Measure

- Amount of grant dollars garnered to support community development research and outreach.

Year	Actual
2010	1456778

Output #4

Output Measure

- Number of agencies partnering in this effort.

Year	Actual
2010	84

Output #5

Output Measure

- Number of volunteers supporting this planned program.

Year	Actual
2010	577

Output #6

Output Measure

- Number of new technologies adopted by producers.

Year	Actual
2010	7

Output #7

Output Measure

- Number of newsletters developed in support of this plan.

Year	Actual
2010	21

Output #8

Output Measure

- Number of newsletters distributed in support of this plan.
Not reporting on this Output for this Annual Report

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Percent of community residents, businesses and leaders who increase their understanding of sustainable community development, tourism and economic development principles.
2	The number of communities which evaluate the potential for sustainable community development, tourism and economic development and prioritize to target specific interests, actions, and valued community resources to maintain and grow.
3	The number of communities which experience increased economic gain from sustainable community development, tourism, and economic development efforts including increased tax revenues, employment, and retention of community valued resources.
4	Planning, development and implementation of bio-based, renewable energy projects (such as processing plant, wind farm).
5	Percent of program participants reporting changing an attitude as a result of these programs.
6	Percent of participants reporting intent to change behavior and/or changing behavior as a result of these programs.
7	Benefits and Costs of Natural Resources Policies Affecting Public and Private Lands
8	Water Policy and Management Challenges in the West

Outcome #1

1. Outcome Measures

Percent of community residents, businesses and leaders who increase their understanding of sustainable community development, tourism and economic development principles.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	55	89

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Viewing Colorado and its varied communities from the perspective of community capital, the assets, needs and opportunities are many. Capital can be thought of as the capacity to do things, or provide things. Professors of Sociology at Iowa State University, Cornelia and Jan Flora (2008) developed the Community Capitals Framework as an approach to analyze how communities work. Using this framework, communities can be thought of as having seven different kinds of capital: natural, financial, human, built, political, social, cultural. Each geographic community or area possesses 'capital' in differing amounts leading to differing levels of community vitality and health.

What has been done

Assist communities in becoming sustainable and resilient to the uncertainties of economics, weather, health, and security.
Increase civic and social responsibility among youth and adults in urban and rural communities by developing and enhancing leadership, citizenship, and public participation skills through partnerships which lead to sustainable communities.

Improve community economic capacity through retaining and growing wealth opportunities by developing and providing tools in marketing, entrepreneurship, risk analysis, and decision-making for both adults and youth.

Results

89% of participants surveyed indicated they had increased knowledge related to one or more of these topics:
community financial capacity building; community social capacity building; individuals' roles in

community capacity building; built environmental community capital development; natural environment capacity building as related to community vibrancy; building community political capacity; understanding the role of cultural capacity in community development.

4. Associated Knowledge Areas

KA Code	Knowledge Area
602	Business Management, Finance, and Taxation
604	Marketing and Distribution Practices
605	Natural Resource and Environmental Economics
608	Community Resource Planning and Development
610	Domestic Policy Analysis
803	Sociological and Technological Change Affecting Individuals, Families, and Communities

Outcome #2

1. Outcome Measures

The number of communities which evaluate the potential for sustainable community development, tourism and economic development and prioritize to target specific interests, actions, and valued community resources to maintain and grow.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	5	45

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Viewing Colorado and its varied communities from the perspective of community capital, the assets, needs and opportunities are many. Capital can be thought of as the capacity to do things, or provide things. Professors of Sociology at Iowa State University, Cornelia and Jan Flora (2008) developed the Community Capitals Framework as an approach to analyze how communities work. Using this framework, communities can be thought of as having seven different kinds of capital: natural, financial, human, built, political, social, cultural. Each geographic community or area possesses 'capital' in differing amounts leading to differing levels of community vitality and

health.

What has been done

Some examples include Jackson County's development of community wildfire protection plans; Larimer's and Weld's strategic plan to prioritize objectives and determine next steps for promoting heritage visitation around the region; Washington, Sedgwick, Phillips, Yuma and Logan Counties' value proposition analysis; and adoption of Colorado Market Maker online platform by over 100 farmers.

Results

45 counties reported they examined and/or evaluated the potential for sustainable community development, tourism and economic development and prioritize to target specific interests, actions, and valued community resources to maintain and grow.

4. Associated Knowledge Areas

KA Code	Knowledge Area
602	Business Management, Finance, and Taxation
604	Marketing and Distribution Practices
605	Natural Resource and Environmental Economics
608	Community Resource Planning and Development
610	Domestic Policy Analysis

Outcome #3

1. Outcome Measures

The number of communities which experience increased economic gain from sustainable community development, tourism, and economic development efforts including increased tax revenues, employment, and retention of community valued resources.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	5	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The CSU Extension Sustainable Community Development program efforts serve audiences that are struggling in difficult economic times. Dolores County has had the States? highest unemployment rate for the last 18 months.

What has been done

Extension efforts provided leadership through the Dolores County Development Corporation and help from Region Nine and the El Pomar Foundation.

Results

They restarted the Chamber of Commerce, added a new tenant to the Business Park (MSTS a Metals? salvage & transfer operation) and expanded the DCTV coverage area.

4. Associated Knowledge Areas

KA Code	Knowledge Area
602	Business Management, Finance, and Taxation
604	Marketing and Distribution Practices
605	Natural Resource and Environmental Economics
608	Community Resource Planning and Development
610	Domestic Policy Analysis

Outcome #4

1. Outcome Measures

Planning, development and implementation of bio-based, renewable energy projects (such as processing plan, wind farm).

Not Reporting on this Outcome Measure

Outcome #5

1. Outcome Measures

Percent of program participants reporting changing an attitude as a result of these programs.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
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3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Viewing Colorado and its varied communities from the perspective of community capital, the assets, needs and opportunities are many. Capital can be thought of as the capacity to do things, or provide things. Professors of Sociology at Iowa State University, Cornelia and Jan Flora (2008) developed the Community Capitals Framework as an approach to analyze how communities work. Using this framework, communities can be thought of as having seven different kinds of capital: natural, financial, human, built, political, social, cultural. Each geographic community or area possesses 'capital' in differing amounts leading to differing levels of community vitality and health.

What has been done

Train Extension personnel in community mobilization, facilitation, economic development; work with rural communities on a regional approach to small town tourism including making optimal use of environmental resources, respecting the socio-cultural authenticity of host communities while conserving their built and living cultural heritage and traditional values, and ensuring viable, long-term economic operations, including stable employment and income-earning opportunities; conduct basic and applied research in areas exploring the interface between agribusiness, rural development, and natural-resource-amenity-based opportunities; conduct workshops and other educational activities with community stakeholders.

Results

68% of participants surveyed indicated they had changed an attitude as a result of CSU Extension programming, related to one or more of these topics: community financial capacity building; community social capacity building; importance of community capacity building; built environment community capital development; natural environment capacity building as related to community vibrancy; building political capacity of community; building cultural capacity of community.

4. Associated Knowledge Areas

KA Code	Knowledge Area
602	Business Management, Finance, and Taxation
604	Marketing and Distribution Practices
605	Natural Resource and Environmental Economics
608	Community Resource Planning and Development
803	Sociological and Technological Change Affecting Individuals, Families, and Communities

Outcome #6

1. Outcome Measures

Percent of participants reporting intent to change behavior and/or changing behavior as a result of these programs.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	75	87

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Viewing Colorado and its varied communities from the perspective of community capital, the assets, needs and opportunities are many. Capital can be thought of as the capacity to do things, or provide things. Professors of Sociology at Iowa State University, Cornelia and Jan Flora (2008) developed the Community Capitals Framework as an approach to analyze how communities work. Using this framework, communities can be thought of as having seven different kinds of capital: natural, financial, human, built, political, social, cultural. Each geographic community or area possesses "capital" in differing amounts leading to differing levels of community vitality and health.

What has been done

Train Extension personnel in community mobilization, facilitation, economic development; Work with rural communities on a regional approach to small town tourism including making optimal use of environmental resources, respecting the socio-cultural authenticity of host communities while conserving their built and living cultural heritage and traditional values, and ensuring viable, long-term economic operations, including stable employment and income-earning opportunities; Conduct basic and applied research in areas exploring the interface between agribusiness, rural development, and natural-resource-amenity-based opportunities; Conduct workshops and other educational activities with community stakeholders.

Results

% of participants surveyed indicated they intended to adopt a new behavior related to one or more of the following: community financial capacity building, community social capacity building, community capacity building, built environmental community capital development, community vibrancy, building capacity within the community, and/or building cultural capacity within community.

4. Associated Knowledge Areas

KA Code	Knowledge Area
602	Business Management, Finance, and Taxation
604	Marketing and Distribution Practices
608	Community Resource Planning and Development
803	Sociological and Technological Change Affecting Individuals, Families, and Communities

Outcome #7

1. Outcome Measures

Benefits and Costs of Natural Resources Policies Affecting Public and Private Lands

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

City, County, State and Federal agencies as well as non-governmental conservation groups and their staffs, often need benefit-cost information about a wide range of non market natural resources. These range from the benefits of protecting human health (air quality, water quality) to valuation of fishing and protecting endangered fish. However, public policy decisions frequently must be made quickly and agency staff economists often do not have time or budgets to perform original economic valuation studies in time for making agency decisions. Agency economists also need sound non-market valuation methods for important analyses that warrant an original benefit-cost study.

What has been done

In this project we obtained data from the State of California on behalf of the USDA Forest Service to estimate the health effects from air pollution arising from forest fires in National Forests. A summary of more than a decade's worth of research on non-market valuation of fire was coauthored with a USDA Forest Service scientist and presented at a workshop for fire managers

sponsored by CSU and at a Portland State University workshop for USDA Forest Service field personnel. We conducted statewide recreational surveys of anglers? economics benefits in Colorado.

Results

The U.S. Bureau of Land Management (BLM) relied upon our research in drafting its Instruction Memo 2010-061 "Guidance on Estimating Nonmarket Environmental Values", issued March 2010. BLM in Grand Junction is relying upon prior research from this project for visitor expenditures and values for the Grand Junction Resource Management Plan. This saved BLM tens of thousands of dollars and more than six months time from not having to conduct its own study of Off-Highway recreation. These examples suggest significant cost savings are being realized by agencies and non-governmental organizations being able to apply our new and existing studies to emerging natural resource policy issues without having to conduct their own expensive studies and without having to delay management decisions while new economic studies are conducted.

4. Associated Knowledge Areas

KA Code	Knowledge Area
605	Natural Resource and Environmental Economics
610	Domestic Policy Analysis

Outcome #8

1. Outcome Measures

Water Policy and Management Challenges in the West

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Statewide population in Colorado is forecasted to more than double over the next 50 years. Most of this growth is expected to occur along Colorado's Front Range. The state of Colorado is currently trying to determine how best to meet the water needs of future residents. Water conservation and the reallocation of water from Ag to municipal uses are the two most likely candidates for meeting new demands.

What has been done

: Project activities focused on developing a better understanding of how to successfully design alternative market-based instruments which allow for the reallocation of water from ag to urban uses without the negative side effects associated with traditional "buy and dry" methods. Outputs associated with design of alternative market based instruments, computerized water market experiment to test impact of different institutional settings on the effectiveness of water markets and impacts on agriculture. Experiment was run several times including with test subjects (spring 2010), irrigators (08/2010), and state officials (05/2010). The experiment was also run each semester in class to enhance students understanding of water markets (Spring and Fall 2010).

Results

Results from the experimental water market suggest that while the introduction of active water leasing markets will result in more water in agriculture, it may make irrigators worse off. This is especially the case if information about past transactions is not publicly available. These results directly address questions/concerns raised by irrigators about participating in water leasing at the start of the project. These results were communicated to state officials, who indicated they will incorporate these findings into future discussions regarding the design of alternative institutions. The results provide insight into why many in irrigated agriculture are reluctant to participate in alternatives to traditional water rights transfers. The water market program was also used as a learning tool on several different occasions to help students, irrigators, and state officials better understand how water markets work and the decision process for those involved. Evidence of the impact of the learning exercise includes: comments from one participant who indicated that it contributed to a change in their thinking about whether or not to sell their water rights and student course evaluations which indicated it changed their thinking about the reallocation of water using markets. In terms of research, the results have provided new insight into how water rights and water leasing markets interact.

4. Associated Knowledge Areas

KA Code	Knowledge Area
605	Natural Resource and Environmental Economics
610	Domestic Policy Analysis

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Appropriations changes
- Public Policy changes
- Government Regulations
- Competing Public priorities
- Competing Programmatic Challenges
- Populations changes (immigration, new cultural groupings, etc.)

Brief Explanation

In the recent Colorado Rural Development Council's 2008 Annual Report 13 Colorado

counties are now being referred to as AgUrban. These counties have access to additional resources economic and political resources and face additional challenges such as infrastructure for transportation systems that link the urban/rural interface they represent.

V(I). Planned Program (Evaluation Studies and Data Collection)

Evaluation Results

Most data for educational seminars, workshops and programs is collected via surveys at the end of classes regarding perceived knowledge gained and potentially several weeks after classes to measure behavior change. Other data is drawn from sources such as summary reports on completed projects, focus groups, and observation.

Key Items of Evaluation

CSU Extension Sustainable Community Development program efforts provide opportunities for engagement in collaborative strategic planning. . . . "When local citizens and agency representatives are engaged in collaborative strategic planning related to issues that directly impact their lives, they form strong working relationships that foster effective working partnerships. The result is the strengthening of an engaged citizenry who take responsibility for participating in developing alternative solutions to address critical social, economic and environmental issues in their community, state, nation and world." (Jackson County, 2010)

V(A). Planned Program (Summary)

Program # 8

1. Name of the Planned Program

Clean Energy Strategic Initiative

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
132	Weather and Climate	1%		0%	
402	Engineering Systems and Equipment	1%		0%	
605	Natural Resource and Environmental Economics	1%		0%	
803	Sociological and Technological Change Affecting Individuals, Families, and Communities	97%		0%	
	Total	100%		0%	

V(C). Planned Program (Inputs)

1. Actual amount of professional FTE/SYs expended this Program

Year: 2010	Extension		Research	
	1862	1890	1862	1890
Plan	2.0	0.0	0.0	0.0
Actual	1.8	0.0	0.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
61870	0	0	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
61870	0	0	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
148085	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Through our educational efforts, Colorado residents, businesses, and local governments are being empowered to make environmentally and financially-sound energy decisions by the provision of locally relevant research-based information and resources.

These efforts contribute to cleaner air and water, reduced greenhouse gas emissions, fewer negative human health effects from fossil fuels, and enhanced financial positions through lower energy costs. This may also contribute to greater domestic energy independence and national security, as well as the growth and stabilization of a new 'green' economy characterized by job gain and focused economic development in the clean energy sector

2. Brief description of the target audience

Colorado individuals, families and communities interested in clean energy.

V(E). Planned Program (Outputs)

1. Standard output measures

2010	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	33516	37762	1982	0

2. Number of Patent Applications Submitted (Standard Research Output)

Patent Applications Submitted

Year: 2010
Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2010	Extension	Research	Total
Actual	3	0	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of trainings/workshops/field days/camps/classes conducted

Year	Actual
2010	263

Output #2

Output Measure

- Amount of grant dollars generated to support clean energy

Year	Actual
2010	840585

Output #3

Output Measure

- Number of technical (fact sheets) generated about clean energy

Year	Actual
2010	3

Output #4

Output Measure

- Number of volunteers supporting clean energy

Year	Actual
2010	111

Output #5

Output Measure

- Number of partnering agencies/organizations around clean energy

Year	Actual
2010	150

Output #6

Output Measure

- Number of Extension Agents trained

Year	Actual
2010	17

Output #7

Output Measure

- Number of new technologies adopted by individuals/families/organizations/communities

Year	Actual
2010	10

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Percent of participants reporting increase in knowledge about clean energy
2	Percent of participants reporting intent to change/change in behavior in energy use
3	Percent of participants reporting a change in condition in their home, business, community, etc.
4	Percent of participants reporting change in behavior/use of skills.

Outcome #1

1. Outcome Measures

Percent of participants reporting increase in knowledge about clean energy

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	50	47

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Energy issues have gained prominence in recent years due to the economic crisis, climate change, the BP oil spill, and otherwise. In Colorado, one of the most aggressive renewable portfolio standards in the nation has been adopted as part of the state's move toward a New Energy Economy. As a result, Extension offices have been contacted in increasing numbers to provide energy information to residents, businesses, and local governments. These efforts contribute to cleaner air and water, reduced greenhouse gas emissions, fewer negative human health effects from fossil fuels, and enhanced financial positions through lower energy costs. This may also contribute to greater domestic energy independence and national security, as well as the growth and stabilization of a new 'green' economy characterized by job gain and focused economic development in the clean energy sector.

What has been done

The educational strategy is to:

- 1) further individual Work Team members' expertise on various energy technologies so as to be a well-informed, comprehensive informational resource;
- 2) educate other Extension agents on the basics of energy efficiency and renewable energy and walk them through the primary resources available to them for more information; and
- 3) educate Colorado residents, businesses, and local governments on locally-relevant clean energy options and issues in person, via multimedia, and through partnerships.

Results

47% of participants indicated they increased their knowledge about clean energy, including wind, solar, biomass/biofuel, geotherman/hydropower, home/community energy, and/or STEM.

4. Associated Knowledge Areas

KA Code	Knowledge Area
803	Sociological and Technological Change Affecting Individuals, Families, and Communities

Outcome #2

1. Outcome Measures

Percent of participants reporting intent to change/change in behavior in energy use

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	50	50

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Energy issues have gained prominence in recent years due to the economic crisis, climate change, the BP oil spill, and otherwise. In Colorado, one of the most aggressive renewable portfolio standards in the nation has been adopted as part of the state's move toward a New Energy Economy. As a result, Extension offices have been contacted in increasing numbers to provide energy information to residents, businesses, and local governments.

These efforts contribute to cleaner air and water, reduced greenhouse gas emissions, fewer negative human health effects from fossil fuels, and enhanced financial positions through lower energy costs. This may also contribute to greater domestic energy independence and national security, as well as the growth and stabilization of a new 'green' economy characterized by job gain and focused economic development in the clean energy sector.

What has been done

The educational strategy is to:

- 1) further individual Work Team members' expertise on various energy technologies so as to be a well-informed, comprehensive informational resource;
- 2) educate other Extension agents on the basics of energy efficiency and renewable energy and walk them through the primary resources available to them for more information; and
- 3) educate Colorado residents, businesses, and local governments on locally-relevant clean

energy options and issues in person, via multimedia, and through partnerships.

Results

50% of participants indicated they changed an attitude and/or were intending to change a behavior as a result of Extension Clean Energy programming. Topics included wind, solar, biomass/biofuel, geotherman/hydropower, home/community energy, and/or STEM.

4. Associated Knowledge Areas

KA Code	Knowledge Area
803	Sociological and Technological Change Affecting Individuals, Families, and Communities

Outcome #3

1. Outcome Measures

Percent of participants reporting a change in condition in their home, business, community, etc.

Not Reporting on this Outcome Measure

Outcome #4

1. Outcome Measures

Percent of participants reporting change in behavior/use of skills.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	{No Data Entered}	41

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Energy issues have gained prominence in recent years due to the economic crisis, climate change, the BP oil spill, and otherwise. In Colorado, one of the most aggressive renewable portfolio standards in the nation has been adopted as part of the state's move toward a New Energy Economy. As a result, Extension offices have been contacted in increasing numbers to provide energy information to residents, businesses, and local governments.

What has been done

The educational strategy is to:

- 1) further individual WT members' expertise on various energy technologies so as to be a well-informed, comprehensive informational resource;
- 2) educate other Extension agents on the basics of energy efficiency and renewable energy and walk them through the primary resources available to them for more information; and
- 3) educate Colorado residents, businesses, and local governments on locally-relevant clean energy options and issues in person, via multimedia, and through partnerships.

Results

41% of participants indicated they had changed a behavior/used skills as a result of Extension Clean Energy programming. Areas of change included wind, solar, biomass/biofuel, geothermal/hydropower, home/community energy, and/or STEM.

4. Associated Knowledge Areas

KA Code	Knowledge Area
803	Sociological and Technological Change Affecting Individuals, Families, and Communities

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Appropriations changes
- Public Policy changes
- Government Regulations
- Competing Public priorities
- Competing Programmatic Challenges
- Populations changes (immigration, new cultural groupings, etc.)

Brief Explanation

Weather extremes have a significant effect on energy use for heating and cooling as well as irrigation. Economic growth may lead to greater energy use, while an economic recession may lead to the opposite. Less funding may lead to reduced energy use in the government and non-profit sectors in particular. Public policy and government regulations can make financial incentives more or less attractive for consumers and can also require clean energy to be utilized to a certain extent. Competing public priorities can crowd out the tax credits available for energy efficiency and renewable energy. Competing programmatic challenges affect Clean Energy Strategic Initiative Team's (CESIT) outreach efforts since only one specialist is dedicated to clean energy full-time. Demographic (population changes) can increase or decrease consumer energy use as higher income groups tend to use more energy than lower income groups.

V(I). Planned Program (Evaluation Studies and Data Collection)

Evaluation Results

All indicators except for 'Participants reduce fossil fuel energy use as measured by the number of utility-generated BTUs used' will be measured using an after-only post program survey (summative evaluation). The survey will be filled out by program participants immediately following any energy-related program using a Likert-item scale with an option for N/A since not every presentation will cover all indicators.

Surveys will be collected by the presenter and sent to the Clean Energy Specialist for reporting and recordkeeping. Mean scores will be reported for each of these indicators, with 1 indicating that the program had no effect and 5 indicating that the program had great effect. (N/A will not be counted.)

The indicator, 'Participants who reduce fossil fuel energy use as measured by the number of utility-generated BTUs used' will be measured using data provided by utilities. Every program participant will be asked to sign a waiver on the survey that will authorize Extension to collect one year's worth of pre- and post-program data from both the natural gas and electric utility serving that participant. (Therms and kilowatt-hours will be converted to BTUs for ease of calculation.) Data from a sample size of between 5 and 25% of participants providing authorization will be collected, analyzed, and reported both independently and in comparison to average Colorado residents if available.

Key Items of Evaluation

- Individuals, businesses, and local governments will continue or increase their levels of interest in clean energy issues.
- There is value in conducting outreach to help these constituents better understand clean energy options and the plethora of ever-changing financial incentives related to them.
- Residents will implement low- or no-cost energy conservation, energy efficiency, and renewable energy measures if provided with needed information.
- The costs of clean energy will continue to become more attractive and competitive versus fossil fuel energy sources.