

# 2008 Colorado State University Combined Research and Extension Annual Report of Accomplishments and Results

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## I. Report Overview

### 1. Executive Summary

This executive summary highlights research and extension outcomes that are illustrative of the scope of programs and their impact, the breadth of challenges and response to stakeholders and others, and the collaborative, integrated and interactive efforts from Colorado State University research and extension programs. Integral to these and other outcomes is Colorado State University's commitment to research and extension programs that address economic viability, environmental sustainability and social acceptability of outcomes impacting agriculture, natural resources, families and consumers, youth, and other end-users.

Of the seven programmatic areas incorporated in this report, five reflect integrated and interactive research and extension planning and execution while two are solely Extension programs (4-H Youth Development and Strong Families, Healthy Homes). These five programs are:

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

It should be noted that although programs reflect broad categorization, programs are cross-cutting and reflect the complex nature of research and extension activities.

**Colorado Wheat Industry.** Research and extension programs incorporate breeding, variety trials, certified seed increases, and crop management systems to provide new cultivars, cropping systems and best management practices for the industry. This information is communicated through web-sites, scientific publications, technical reports, workshops conducted by faculty and extension personnel and through an extraordinary positive working relationship with the Colorado Wheat Growers Association and the Colorado Wheat Administrative Committee.

Development of improved wheat cultivars serves the wheat industry in Colorado by reducing wheat production costs, reducing pesticide use, and providing improved marketing options. CSU-bred wheat cultivars account for nearly 60% of Colorado's 2.4 million acres (2008 crop) with the remaining acreage planted mostly with cultivars from university breeding programs in adjacent states. Since 1963, average wheat grain yields in Colorado have more than doubled with at least 50% of this increase attributed to improved cultivars. With regard to quality, estimates from Colorado wheat industry leaders indicate that end-use quality enhancements from cultivars developed at CSU provide an average of \$20 million per year increased income for Colorado wheat producers (83 million bushels x \$0.25 per bushel price increase; 2003 dollars).

In fall 2008, experimental line CO03W239 was released as an improved cultivar named Thunder CL. Thunder CL is an awned, white-glumed, hard white winter wheat. Thunder CL has shown superior grain yield under both non-irrigated and irrigated production conditions in eastern Colorado. Thunder CL carries the Als1 gene conferring tolerance to imazamox herbicide, shows moderate resistance to wheat streak mosaic virus, stripe rust (*Puccinia striiformis* Westend.) and stem rust (caused by *Puccinia graminis* Pers.:Pers f. sp. *tritici* Eriks. & E. Henn), and shows superior milling and bread baking quality. Thunder CL is the only yield-competitive, dryland-adapted hard white Clearfield\* wheat cultivar available in the Great Plains.

Certified seed usage in Colorado reached a new high in fall 2007, with 30.4% of wheat acres. Recent increases are attributed to the adoption of Hatcher and to the reputations of the CSU Variety Testing Program and the local seed grower businessmen. Seed growers grew 850 acres of Registered seed production of the new CSU-developed wheat variety "Bill Brown". This will allow for fast adoption of this new hard red winter wheat and further increases in acreage planted to certified seed. The new high yielding and high quality variety Hatcher was planted on 22% wheat acreage in 2008 by comparison to 7% in 2007.

We have documented limited irrigation cropping systems water conservation as much as \$350 mm yr-1 compared to fully irrigated corn while maintaining similar on-farm economic returns. 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.

**Livestock Production, Marketing, Distribution, and Education.** Animal agriculture is the leading agricultural activity in

Colorado. In 2007, live meat animal and animal product sales in Colorado were valued at \$4.271 billion and the value of dairy production was \$516 million. Livestock and livestock products accounted for 72% of crops and livestock sales in the state.

We have developed decision support systems for the cow/calf producer that are designed to be used by producers to evaluate sire selection decisions based on the impact those sires' progeny might have on the profitability of the specific producers operation. Currently, there are seven participating breed associations that have contributed expected progeny differences for use in the decision support system. Additionally, we are developing breed-wide selection indexes using this system for release to entire breeds and their customers. These will be simultaneously released with the expected progeny differences twice per year. Given that this single association transfers over 6500 bulls in a single year, assuming bulls are used for 3 breeding seasons, each of these animals could produce upwards of 75 progeny for a total of nearly 500,000 offspring. If use of this system results in the selection of bulls whose progeny are more profitable, the result would be a considerable improvement for the customers of this breed. Magnified over 6 additional breeds and the results become more important. Given the 700,000 plus cows in Colorado, an improvement of \$10 per head would result in an improvement of 7 million dollars net revenue. Additionally we continue to disseminate information on beef production systems through the CSU Beef Team comprised of faculty and extension personnel and through the CSUBeef.com website .

Large numbers of finished beef cattle now are marketed on grid-based pricing systems. Carcasses that do not conform to mainstream specifications generally do not achieve full value due to failure to achieve premium prices. Research was conducted to evaluate beef carcass ribeye area at the 12th and 13th rib interface (LMA) and its relationship to portion sizing acceptability of other muscles in the carcass. A nationwide survey was conducted with foodservice chefs and retail meat merchandisers to evaluate acceptability of portion sizes and dimensions of individual muscle cuts. Many muscles were still acceptable to retail merchandisers and foodservice chefs in portion size, even though carcass LMA was outside the range of commercially acceptable sizes. This study demonstrates that carcass LMA is not an accurate determinant of the size, and subsequent acceptability, of other muscles in the carcasses and may not be a good determinant of the remaining value of the beef carcass; it will be used by industry to modify current beef pricing practices.

Improving the competitive position and sustainability of independent livestock producers and sustaining the economic and environmental health of the rural communities that depend upon them requires the development of educational programs to reach students and appropriate clientele groups. The Western Center for Integrated Resource Management graduate program will continue to be the primary emphasis with more attention to the outreach/distance education component. We offered two courses online during Fall 2008. Our enrollment in these two courses, which include our hallmark introductory course (AGRI 630) and our animal resource course (AGRI 633), have attracted eight and three students, respectively. This enrollment has been accomplished without marketing or promotion, merely by student inquiry, so we expect the program to grow as we work with Colorado State's Continuing Education unit to promote these courses. We have experienced significant interest in our online degree program. That program will eventually include all 11 of our courses. Two additional courses will be offered online this spring, and another two next fall. With a total of six of our courses online next fall, we will have achieved our goal of providing international access to our courses. A cooperative agreement is being negotiated through the College of Agriculture to offer our distance program through 12 other universities, allowing graduate students from those other institutions to access our courses and receive credit through their home institutions. This program is now tentatively named AG-IDEA, and details are available at <http://www.agidea.org/>.

**Colorado Potato Industry.** Potato Virus Y has been an ongoing disease threat and problem for both seed and commercial producers in Colorado. This disease is especially problematic in cultivars such as Russet Norkotah. PVY can reduce yields and size of tubers harvested and is instrumental in the majority of rejections from the Colorado certification program. Currently, 45% of the certified seed acreage in Colorado is grown to Russet Norkotah selections, about 2800 ha. This research impacts over 1700 ha of seed which is annually rejected for certification. Findings of the PVY research indicate that certain cultivars such as Russet Norkotah tend to have a higher variance regarding PVY infection in the Post Harvest Testing than other less susceptible cultivars. Roguing infected plants from lots with higher levels of PVY tended to mechanically spread the virus to other nearby plants resulting in a situation where for each three infected plants rogued, there were an additional two plants infected but not visually evident. Finally, PVY symptom expression in Russet Norkotah was found to be transient, not latent, and expression occurred throughout the season. This trait by this cultivar makes it virtually impossible to effectively rogue out all PVY positive plants and leaves between 10-25% of the infected plants in the field after roguing is finished to act as late season inoculum sources within the field. Improved management of PVY can reduce rejections and result in additional \$2.5 to 3.5 million in revenue to the certified seed growers.

Release of new potato cultivars requires addressing production management problems and providing producers with Cultural Management Profiles and Guides associated with new cultivars. Each potato cultivar has its own unique set of cultural management requirements. To realize the yield and quality potential of any cultivar, optimum management guidelines for that cultivar need to be

followed. Canela Russet is a potato that produces quality tubers. The major drawback that prevented easy adoption of this cultivar was the long tuber dormancy and late field emergence. Results from 2008 studies indicated that reconditioning of the tubers between 10 to 13 degrees celcius for 14 days before planting enhanced field emergence; and cutting the seed to a size of 85-100g increased tuber yield. With these findings, growers of Canela Russet are able to harvest the crop earlier than before, and therefore avoid the potential of frost damage due to late harvest. Increased tuber yields have also been realized by growers.

Results of these research and extension programs are communicated to industry through workshops, industry meetings and conferences, scientific and technical publications and interaction with the Colorado Potato Administrative Committee and Colorado Certified Potato Growers Association.

**Plant Select and Native Plant Master Programs.** Colorado is an urban state, with 80% of the population living in urban areas. The green industry of Colorado comprises a significant part of Colorado agriculture; it has been recognized as "agriculture" by the Colorado General Assembly. The industry includes production, wholesale, and retail sales for floriculture, nursery, and tree crops, garden supplies, irrigation equipment, outdoor equipment, and development and care services for landscapes, such as golf courses, landscape design and construction, and landscape maintenance for homes, businesses, and public gardens and cemeteries. Colorado expenditures on garden-related products, landscape and lawn service, and other related green industries (irrigation, botanical gardens, and outdoor equipment) have averaged 10 percent annual growth since 1993, resulting in \$1.67 billion in direct sales. (This generates an economic impact of \$2.1 to \$5.0 billion depending on the economic multiplier used.) The landscape-related industries of Colorado employ nearly 34,000 positions (6 percent average annual growth) with a payroll of \$825 million annually (18 percent average annual growth). Thirty percent of industry revenues are generated from domestic and international sales.

Through the Plant Select Program, specific performance results from annual herbaceous and woody plant trials help determine which new and superior annual flowers and herbaceous perennial varieties growers throughout the state and region should be grown and marketed. In 2008, seven plant species were recommended or introduced by Plant Select. Over ninety demonstration gardens are displaying Plant Select plants throughout Colorado. Plant Select plants which are either introductions or recommendations throughout the state and region means marketing more profitable plants for growers and retailers throughout the state and region. In 2008, over 1.8 million Plant Select labeled plants were sold.

The mission of the Native Plant Education team is to educate the public about native plants in order to foster stewardship, sustainable landscaping and management of weeds that threaten native ecosystems. In 2008 37 Native Plant Master courses (three four-hour sessions) were taught; 396 persons taught (those going on to volunteer and those choosing not to enter volunteer program). 74 percent reported beginning or increasing weed control efforts; 76 percent began planting or increased planting of native plants. 84 percent educated others about the value of native plants for landscaping and 80 percent went on to educate others about the impact of weeds on native plants. Over 1.1 million acres of land have been the target of weed control efforts.

**Water Quality, Quantity and Issues.** Agriculture, industry, homeowners and agencies look to Colorado State University to provide research-based information and educational programs on water quality, water quantity, water policy, and other water resource issues. Through CSU Extension's partnership with the Northern Plains and Mountains Regional Water Program ([wsprod.colostate.edu/cwis435/northern\\_plains\\_mountains/1\\_Main\\_Page.htm](http://wsprod.colostate.edu/cwis435/northern_plains_mountains/1_Main_Page.htm)), two mini-grants were funded with regard to private wells and septic systems. Attendees had their wells tested to ensure water was potable and to screen for heavy metals and other contaminants that can impair human health. These two mini-grants reported impact on 240 private wells with 40 percent reporting that they will increase monitoring of water quality of their wells. After the workshop participants also understood how septic functions and how to maintain them to prevent large economic costs for replacement due to failure or for contaminating the groundwater. Because of this program, increasing knowledge of testing increases the likely hood of testing private wells and detecting potential issues with water quality.

Accurate estimates of water availability, demand, use, and augmentation requirements play an essential role in keeping Colorado agriculture competitive, in developing rural communities, and in promoting harmony between agriculture and the environment. CSU, being a credible impartial party in water issues, is able to develop methodologies and software that build consensus on water issues and prevent costly legal battles. The SPMAP tools, including the Augmentation Accountant, IDSCU, and Aquifer Water Accounting System (AWAS) have a proven track record with water managers dealing with the complex issues pertaining to water scarcity and high demand. We continue to very actively work with the water community to enhance the tools to meet the ever increasing set of complex problems facing agricultural water users. AWAS was adopted by the State Engineer as the program to use for estimating the impacts of depletions or accretions to the river. This means that most or all augmentation plans that are being processed by the state are using tools that we have developed as part of this process.

In cooperation with the Colorado Department of Agriculture, Extension developed guidelines to help Colorado crop producers employ Best Management Practices (BMPs) that protect the state's water resources while allowing producers to remain

economically competitive.

**Energy.** In order to develop a set of simple tools for Colorado dairy producers to make preliminary assessments on the feasibility of installation of anaerobic digesters, a digester was installed at an organic dairy near Platteville, Colorado. Based on a previously-reported study on alternative energy, this feasibility study included a determination of biochemical methane potential for various waste streams generated on and nearby the dairy and an assessment of appropriate technologies. While installation of an anaerobic digester at the dairy facility investigated was determined to be technically feasible, an economic analysis showed that installation would not be economically viable. Further, several technical barriers were identified. Based on lessons learned from this feasibility study, a protocol has been developed and documented for future feasibility studies on anaerobic digester installation at animal feeding operations. This will help producers and their advisers to go through the preliminary steps of a feasibility study, thus improving their ability to make informed decisions. A report was provided to the dairy and to the Governors Energy Office detailing findings from the feasibility study.

The Clean Energy Strategic Initiative Team (CESIT) includes seven subcommittees gathering relevant information about clean energy industries or opportunities within the CSU research and extension community. The topic areas for the seven subcommittees include: Solar; Wind; Biomass & Biofuels; Geothermal & Hydropower; Homes & Community; 4-H & Schools; Grants & Funding. Each CESIT subcommittee will be creating both printed material and educational workshops about their topic.

**Pest Management.** A long-term weed shift study in irrigated crops including corn shows that slow, subtle changes in weed dynamics occur when the same control method, such as only glyphosate use in Roundup Ready crops, is used year after year. We demonstrated that use of a reduced rate of a preemerge herbicide in such systems can improve both total weed control, crop yield, and economic return. Many corn producers have re-integrated soil applied herbicides into their production plans for two reasons. First, it greatly reduces early season weed competition and gives growers a wider time window in which to make the post emergence glyphosate applications. Second, the net return to the grower, after subtracting the added cost of the soil applied herbicide, is in the range of 25 to 50 dollars additional income per acre. For producers with large corn acreage, this represents a considerable boost in income on an annual basis. Results of this research project are shared with crop producers, crop consultants, and other interested parties via extension workshops, scientific and technical publications and presentations at professional meetings.

**Small Acreage Issues and Opportunities.** The Census of Agriculture reports decreasing numbers of mid- and large-sized farms and a significant increase in the number of small farms; the latter category of individuals frequently do not have much agricultural and business knowledge. CSU research and extension programs are addressing small acreage producers' needs through research and educational programs including plant selection, production systems, supply and marketing chains, product differentiation, consumer product marketing, risk and financial management tools and rural entrepreneurship.

As a result a worldwide hop shortage that began in 2007, there has been a keen interest from both growers and brewers alike. Microbrewers need a consistent quality and economic source of hops from growers. Twenty different hops varieties, commonly used by craft breweries, were evaluated to determine the commercial potential for organic production under irrigated conditions. Results indicate that approximately ten varieties produce a sufficient quantity and quality of hops to be commercially viable in the arid inter-mountain west. In 2008, ten acres were planted and harvested for commercial production and an estimated 50 acres will be added in 2009. A hops production workshop, with an emphasis on organic production, was organized and held in Hotchkiss, Colorado, in July of 2008 and was attended by 70 participants. Approximately half of the attendees were brewery owners and/or brewers, mostly from Colorado but also from several neighboring states with interest in establishing hops production and supply agreements with area growers.

**4-H Youth Development.** A workforce strong in science, technology, engineering and math is essential for Colorado to compete in the national and global economy. 4-H Youth Development's Science, Engineering and Technology (SET) initiative reaches more than five million youth nationwide with hands-on learning experiences that encourage discovery, develop young minds and fill the pipeline of young leaders proficient in science. 4-H Youth Development is strategically positioned with CSU Extension's direct connection to the cutting-edge research and resources of Colorado State University and the nation's 106 land-grant universities and colleges. Nationally, 4-H has set a goal of preparing one million new young people to excel in science, technology, engineering and math by 2013.

**Strong Families, Healthy Homes.** 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. Our family and youth programs are experiencing change. Local citizens are increasingly looking to Extension for expertise in managing resources, including family and business finances. Healthy living, money matters, nutrition on a budget and snack ideas for children

are just a few of the ways Extension helps stretch precious personal, family and business resources:

- Because raising children is the most challenging job anyone can have, CSU Extension provides parenting classes, childcare provider workshops and other human development training for both families and professionals in Colorado.
- Direct costs (medical care) plus indirect costs (lost productivity/premature death) of diabetes in Colorado is estimated at \$1.4 billion. Extension family and consumer sciences agents partner with Colorado agencies, organizations and businesses to provide diabetes education through a regional Diabetes Health Fair and other workshops, seminars and activities.
- Radon is the second leading cause of lung cancer behind smoking. According to EPA radon level maps, Northeast Colorado may have some of the highest levels in the country. To educate the public and promote testing, expanded efforts by CSU Extension provide certification will allow home and business radon mitigation for those in need.
- Approximately 76 million food borne illnesses occur in the U.S. each year. New pathogens, changes in food production and food supply, increased demands for ready-to-eat food and foods eaten outside the home, along with a decline in food safety awareness and insufficient employee training are just a few of the challenges today's consumers face.
- ServSafe is a partnership program of Extension and local health departments. This nationally recognized food safety education program, offered to food service employees and managers in a variety of establishments, increases awareness and promotes positive changes in practices—safer food and a decrease in food borne illnesses is the result.

**New and Emerging Issues.** The use of the Internet to obtain information continues to rise. To accomplish a goal of reaching traditional as well as new audiences with the latest information, in a timely manner, in 2008 CSU Extension communications and IT staff, along with researchers from the Journalism and Technical Communication (JTC) department, conducted usability testing on a website redesign. They followed protocol outlined by the U.S. Department of Health and Human Services research-based web design and usability guidelines. ([www.usability.gov/pdfs/guidelines.html](http://www.usability.gov/pdfs/guidelines.html)) The website ([www.ext.colostate.edu](http://www.ext.colostate.edu)) went live October 1, 2008, and templates for use in the counties are being adapted in local areas.

NOTE: Information included in this report comes from projects and educational programs through Hatch and Smith-Lever federal funds. Additional supplemental funding from various sources accomplishes overall research and programming goals.

Quantitative outcome targets and actual numbers entered often reflect total effort in a program area. Data are compiled to reflect total effort. Qualitative outcomes or impact statements, in contrast, reflect a single, particular effort within the planned program area. Of work teams reporting working specifically with new/diverse audiences, 202,458 contacts are shown.

**Total Actual Amount of professional FTEs/SYs for this State**

Year:2008	Extension		Research	
	1862	1890	1862	1890
<b>Plan</b>	139.0	0.0	69.0	0.0
<b>Actual</b>	166.0	0.0	55.3	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
- Expert Peer Review

**2. Brief Explanation**

CSU Extension requires that all curriculum and publications be reviewed to assure an appropriate and accurate research base. Programming efforts, including curriculum are peer reviewed through the Work Team and Core Competency Area (CCA) process. All proposed programs, curriculum, and publications are submitted to the appropriate work team (consisting of extension campus and regional specialists and extension agents) for review and approval. Only those programs, curriculum and publications accepted and approved by the work teams are then submitted to the Core Competency Area leaders (Extension specialists and/or Department Heads) for review by the Program Leadership Team (all CCA leaders plus Extension Regional Directors, Diversity Leader, Assistant Director for Operations, Assistant Director for Community Relations, and the Extension Director). Considerations for approval include a completed logic model, including situation statement, target audience, inputs, outputs and outcomes, as well as fiscal and marketing plans. Finally, on a regular basis, the state Extension Advisory Committee also reviews Work Team plans and progress. Again, this year we have implemented a further review process where Work Teams, on a scheduled basis, provide face-to-face reporting on their progress to date, plans for the future, and specific obstacles they have encountered and overcome. At the county level, county programs are reviewed by local county program advisory councils made up of local experts, as well as stakeholders.

The AES uses a college and department based peer review process for all Hatch and McIntire-Stennis research projects. Several of the colleges involved in AES research use peer review in a competitive process to allocate projects and funds. All multi-state projects are peer reviewed using procedures implemented by the Western Association of Agricultural Experiment Station Directors.

### **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

#### **Brief Explanation**

CSU Extension requires a functioning advisory committee in each county or area. In most counties, these committees are appointed by the County Commissioners, assuring that wide representation occurs. The Committees are most often comprised of local residents who have an interest in Extension programming. This may include a representative of the commissioners, school personnel, recipients of Extension programs, volunteers, youth participants, and others. In addition to an overall Extension Advisory Committee in each county, many counties also have program-specific advisory committees (such as 4-H, horse, livestock, etc.). To continue to encourage the use of advisory committee input, this past year we provided in-service education on the use of Advisory Committees for all County Directors and distributed an updated Advisory Committee Manual. That Manual is available on line at: [http://www.ext.colostate.edu/staffres/cad\\_adv\\_cmte.pdf](http://www.ext.colostate.edu/staffres/cad_adv_cmte.pdf) This year has also been one of increased marketing efforts on the part of CSU Extension. Our marketing staff has provided training for agents on marketing of programs to clientele. In addition representatives of the Diversity Catalyst Team have worked specifically with three work teams to improve their outreach to previously unreached audiences with targeted messages to targeted populations. Of work teams reporting specifically their programming to and with new/diverse audiences, 202,458 contacts are shown.

This past year we participated in the NASULGC survey on the value of the Extension brand. Colorado State University Extension communications staff added questions that asked participants to rank the importance of local issues that could be addressed through the CSU research-based information, including issues that are especially critical in the next five years. A total of 335 interviews were conducted online with Colorado residents from June to July 2008. Findings included:

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The top characteristics that motivate consumers to use a resource are: trustworthy source, great staff, convenient access, current and reliable information, expert review, and quality of life.

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Awareness of CSU Extension is higher—at 50 percent—in Colorado than in other states (38%). However, very few know that CSU Extension is part of a larger national network.

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People are very interested in using multiple ways (in-person classes included) to access Extension programs. Extension can broaden access to its programs and services using multiple teaching methodologies.

Based on Colorado-specific questions that were asked, the issues which CSU Extension should address are:

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- Energy – biofuels, solar, wind, biomass (85%)
- 
- Youth development in science, technology, engineering and math (85%)
- 
- Water resources management (84%)
- 
- Water quality (83%)
- 
- Environmental conservation (79%)
- 
- Youth violence (78%)
- 
- Youth development with respect to environment and health (78%)
- 
- Keeping seniors healthy (77%)
- 
- Parenting for at-risk families (77%)
- 
- Drought and fire management (75%)

- Nutrition for low income families (75%)
- Crime prevention and management (73%)
- Urban youth development to encourage college attendance (73%)
- Food safety – personal and restaurant (69%)
- General nutrition (69%)
- Poverty (68%)
- Improving crop yield and productivity (67%)
- Landscaping – soil, composting, weed control, insects, xeriscape (58%)
- Small business development support (57%)
- Accurate information in climate and atmospheric sciences (54%)
- Youth in agriculture (50%)
- Farm and ranch marketing and management (48%)
- Livestock management practices (47%)
- Farm and ranch pest management (47%)
- Small acreage management for new land owners (40%)

In addition, this year Extension hired a grad student to review the web sites of Colorado Counties to establish a database of priority issues that counties have identified. The Director's Advisory Committee reviewed this database to determine the overlap between county priorities and Extension expertise.

Research programs in the AES are guided by advisory committees active at several levels. Each of the 8 off-campus research centers has an advisory committee composed of local agricultural producers, CSU Extension staff, and agency representatives. The advisory committees meet annually with our AES staff. Results of past research are shared and new research initiatives are discussed with committee members. Several agricultural check-off organizations annually provide funding for AES programs which involves a joint review of proposals and research topics. We also have a President's Agricultural Advisory Committee where agricultural leaders are briefed on programs and research needs are discussed.

**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
- Needs Assessments
- Use Surveys
- Other (Council for Agricultural Research, Extension, and Teaching)

**Brief Explanation**

At the county level, advisory committees are appointed by county commissioners and may be individuals who have indicated an interest in Extension programming, or individuals identified by Extension agents or commissioners. They may be representatives of partner agencies, collaborators, representatives of the local school district, volunteers, or others in the community. At the state level, the Colorado Extension Advisory Committee has (by Bylaws requirement) membership representing all areas of the state, partnering agencies (the Green Industry, Farm Bureau, Farmers' Union, etc.). There is gender and racial distribution among the members. Regional representatives are suggested by Extension professionals from across the state and often are either an Extension volunteer or a representative of a partnering agency (Colorado State Patrol, Area Council on Aging). Efforts have been made to ensure that commodity groups are represented.

Stakeholders for AES research programs involve many of the individuals described above for our Extension programs. In the agricultural and natural resource arena, we serve a common set of organizations and industry constituents. Local representatives and faculty are involved in selected members of advisory committees.

**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
- Survey of the general public
- 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

**Brief Explanation**

Stakeholder input is garnered by regular meetings with advisory committees, partners, collaborators, and other interested individuals (volunteers, commissioners). Input is solicited on program direction, focus, implementation, and evaluation. CSU Extension also conducts a yearly survey of county commissioners regarding the strengths and weaknesses of Extension programming in their county. In addition, this year Colorado participated in the NASULGC survey and also conducted a review of county priorities as identified on their web sites. Please see Section 1 under Stakeholder Input for a description of these efforts.

**3. A statement of how the input was considered**

- In the Budget Process
- 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 stakeholders is used in the planning for and revision of CSU Extension programming. Ideas and suggestions are provided through local county advisory committees and the Colorado Extension Advisory Committee (CEAC) regarding the need for new or renewed efforts. The CEAC provides guidance to the Extension Director, Associate Director, and Assistant Directors who then work with the PLT and work teams to establish new programs or modify existing ones. A recent example is the emphasis our stakeholders have urged us to pursue in the area of clean energy.

Stakeholder input is used to annually adjust the AES research program. Major stakeholders in directing research programs are funding agencies such as commodity organizations, and state and federal agencies and advisory committees. For example, clientele, research center and Extension advisory committees in SW Colorado are concerned about having economically viable feed stocks for a developing bio-diesel plant in Dolores, Colorado. Based upon their input, the AES made a decision to retain the SW Colorado Research Center to conduct research and provide information to growers on crops suited to the growing conditions in the region and in turn, for growers to provide reliable sources of feed stocks for the bio-diesel plant. Depending upon the continued need for this center at the end of our five year commitment, a decision will be made to retain or close the center.

With respect to a search for the Dean, College of Agricultural Sciences, stakeholder groups provided input to CSU President Frank on the characteristics that they value in a Dean and also provided members to serve on the search committee. Another example is, annually, the Colorado Potato Administrative Committee and others, in conjunction with the AES, evaluate on-going research and jointly recommend funding research projects from CPAC funds at the San Luis Valley Research Center.

**Brief Explanation of what you learned from your Stakeholders**

In the past year, the CEAC has encouraged CSU Extension to focus efforts on the following: 1. Those programs for which a public value can be articulated. The discussion centered around work that has clear outputs and outcomes, impacts that can be identified and explained to the general public (who may not be stakeholders of Extension). 2. Programs which offer the opportunity to partner with CSU Global or the Division of Continuing Education which provide a broader reach for Extension. Joint programming also allows Extension to meet the educational needs of rural communities for certificate or continuing education courses (such as head start child care providers in remote locations). 3. In terms of programming the CEAC reaffirmed the need for focused programming in the areas of energy, youth development on military bases, 4-H, consumer horticulture, natural resource conservation and protection including efforts to combat deforestation due to the pine beetle, small acreage management, agricultural sustainability, parenting, family financial management, gerontology, and human nutrition.

**IV. Expenditure Summary**

<b>1. Total Actual Formula dollars Allocated (prepopulated from C-REEMS)</b>			
<b>Extension</b>		<b>Research</b>	
<b>Smith-Lever 3b &amp; 3c</b>	<b>1890 Extension</b>	<b>Hatch</b>	<b>Evans-Allen</b>
2708374	0	2763700	0

<b>2. Totaled Actual dollars from Planned Programs Inputs</b>				
	<b>Extension</b>		<b>Research</b>	
	<b>Smith-Lever 3b &amp; 3c</b>	<b>1890 Extension</b>	<b>Hatch</b>	<b>Evans-Allen</b>
<b>Actual Formula</b>	2944310	0	4524198	0
<b>Actual Matching</b>	2944310	0	4524198	0
<b>Actual All Other</b>	7241726	0	4680646	0
<b>Total Actual Expended</b>	13130346	0	13729042	0

<b>3. Amount of Above Actual Formula Dollars Expended which comes from Carryover funds from previous years</b>				
<b>Carryover</b>	2994310	0	1760498	0

**V. Planned Program Table of Content**

<b>S. NO.</b>	<b>PROGRAM NAME</b>
1	4-H Youth Development
2	Strong Families, Healthy Homes
3	Nutrition and Food Safety
4	Animal Production Systems
5	Plant Production Systems
6	Natural Resources and Environment
7	Community Resource Development

**Program #1****V(A). Planned Program (Summary)****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
216	Integrated Pest Management Systems	1%		0%	
307	Animal Management Systems	1%		0%	
802	Human Development and Family Well-Being	6%		30%	
806	Youth Development	92%		70%	
	<b>Total</b>	<b>100%</b>		<b>100%</b>	

**V(C). Planned Program (Inputs)****1. Actual amount of professional FTE/SYs expended this Program**

Year: 2008	Extension		Research	
	1862	1890	1862	1890
<b>Plan</b>	35.0	0.0	0.0	0.0
<b>Actual</b>	52.0	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
916778	0	0	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
916778	0	0	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
2254877	0	0	0

**V(D). Planned Program (Activity)****1. Brief description of the Activity**

•Support traditional club program by recruiting and establishing new clubs •Conduct after school 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 program by:  
 •Conduct agent trainings to develop volunteer management skills •Develop tools to support volunteer management system  
 •Conduct volunteer leader training •Develop 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 programming - all Colorado youth. ages 5 - 19 For volunteers - interested adults, parents, community members, seniors, partner agencies (Boys and Girls Clubs, etc.).

For increased funding - potential funders, including grant providers.

**V(E). Planned Program (Outputs)**

**1. Standard output measures**

**Target for the number of persons (contacts) reached through direct and indirect contact methods**

	<b>Direct Contacts Adults</b>	<b>Indirect Contacts Adults</b>	<b>Direct Contacts Youth</b>	<b>Indirect Contacts Youth</b>
<b>Year</b>	<b>Target</b>	<b>Target</b>	<b>Target</b>	<b>Target</b>
<b>Plan</b>	11500	5000	26000	80000
2008	5748	724	82090	250315

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

**Patent Applications Submitted**

<b>Year</b>	<b>Target</b>
<b>Plan:</b>	0
2008 :	0

**Patents listed**

**3. Publications (Standard General Output Measure)**

**Number of Peer Reviewed Publications**

	<b>Extension</b>	<b>Research</b>	<b>Total</b>
<b>Plan</b>	0	0	
2008	8	0	0

**V(F). State Defined Outputs**

**Output Target**

**Output #1****Output Measure**

- Increased funding for 4-H through private dollars by increasing support from the Colorado 4-H Youth Fund.

Year	Target	Actual
2008	150000	173741

**Output #2****Output Measure**

- Number of web hits regarding 4-H topics

Year	Target	Actual
2008	7500	1023400

**Output #3****Output Measure**

- Number of youth reached by all 4-H delivery methods-club, after school, school enrichment.

Year	Target	Actual
2008	26000	82090

**Output #4****Output Measure**

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

Year	Target	Actual
2008	5	79

**Output #5****Output Measure**

- Number of volunteer management trainings held and tools developed.

Year	Target	Actual
2008	10	119

**Output #6****Output Measure**

- Number of volunteer leaders.

Year	Target	Actual
2008	12500	7595

**Output #7****Output Measure**

- Number of 4-H on-line, e-Learning orientation modules completed by volunteers.

Year	Target	Actual
2008	{No Data Entered}	848

**Output #8****Output Measure**

- Amount of grant dollars generated to support 4-H youth development programs.

Year	Target	Actual
2008	{No Data Entered}	1185292

**Output #9****Output Measure**

- The value of volunteer time that Colorado 4-H adult volunteers provide for 4-H programming - based on an average donation of 128 hours/volunteer @ \$19.510hr. (national average of value of time).

Year	Target	Actual
2008	{No Data Entered}	18966841

**Output #10****Output Measure**

- Increased effectiveness of volunteer leaders as measured by retention rate (%) of first year leaders.

Year	Target	Actual
2008	{No Data Entered}	79

**V(G). State Defined Outcomes**

**V. State Defined Outcomes Table of Content**

O No.	Outcome Name
1	Youth building life skills including leadership, citizenship, decision making and communications skills. Percent of youth reporting positive change in these skills as a result of 4-H participation.
2	Percent of volunteers reporting increase skills in area of responsibility.

**Outcome #1****1. Outcome Measures**

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

**2. Associated Institution Types**

•1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

Year	Quantitative Target	Actual
2008	75	77

**3c. Qualitative Outcome or Impact Statement****Issue (Who cares and Why)**

The benefits of 4-H programs in Colorado have historically been communicated through anecdotes and success stories. These typically reflected the quality of the programs through the gut feelings of those familiar with the program, but did not demonstrate the public value of the youth development program in quantifiable measures. Little sound, research-based information was available to inform the public about the effect 4-H membership (particularly related to life-skill development, an important aspect of 4-H) has on the lives of young people.

**What has been done**

In the summer of 2008, data were collected from Colorado 4-H members in organized 4-H clubs. There were 1,843 surveys collected. Surveys were administered at county fairs and regular 4-H club meetings. 30 counties collected and submitted data on a voluntary basis.

Demographic data collected were:

1. Years in 4-H
2. Age
3. Grade in school
4. Gender

**Results**

As to the life skill with the lowest positive response (leadership), it could be argued that leadership is a higher level life skill which takes a longer span of time to master. The following percentages support this hypothesis:

Percent Positive Leadership Responses

- \* 1-2 years in 4-H 64.5%
- \* 3-4 years in 4-H 73.4%
- \* 5 years or more 88.4%

The positive leadership score increases dramatically as involvement in 4-H increases.

Plans are being made to collect similar data in 2009 using the same sampling technique. The life skills to be measured will be related to science, technology, engineering and math (STEM).

**4. Associated Knowledge Areas**

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

**Outcome #2****1. Outcome Measures**

Percent of volunteers reporting increase 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
2008	70	90

**3c. Qualitative Outcome or Impact Statement****Issue (Who cares and Why)**

New 4-H leaders who take over clubs at times aren't sure what they are doing. Efforts to mentor these new leaders may lead to better leader retention, especially beyond the first year. In addition, providing leadership training to all volunteer leaders assists them to better understand the 4-H program overall, as well as goals for specific projects and their importance to a vibrant 4-H system in Colorado.

**What has been done**

Volunteers were recruited, orientated and follow-up trainings were conducted for new and veteran 4-H leaders. These follow-up sessions were three hours or longer and were conducted in person and online.

**Results**

1,345 of 2,635 (51 percent) volunteers trained reported knowledge gained in the essential elements of 4-H; They also learned the importance of learn-by-doing, appropriate teaching tools, techniques for organizing and conducting a meeting, best communication methods and how to plan activities.

590 of 2,635 (22 percent)volunteers trained reported increased problem solving skills related to planning, organizing and/or decision making. 801 ( 30 percent) of that number reported an increased knowledge or skills related to leadership.

**4. Associated Knowledge Areas**

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

**V(H). Planned Program (External Factors)****External factors which affected outcomes**

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

**Brief Explanation**

The economic downturn and tight budget restrictions may prevent 4-H from experiencing the growth in programming that they are hoping for.However, increased funding to support STEM, urban 4-H, and military 4- H programs may off set any decrease in participation and progamming.

**V(I). Planned Program (Evaluation Studies and Data Collection)****1. Evaluation Studies Planned**

- After Only (post program)
- Before-After (before and after program)
- During (during program)
- Comparisons between program participants (individuals,group,organizations) and non-participants
- Comparisons between different groups of individuals or program participants experiencing different levels of program intensity.

#### **Evaluation Results**

During the summer of 2008 data were collected related to life skill development of Colorado 4-H members in organized 4-H clubs. Surveys were administered at county fairs and regular 4-H club meetings. There was no random assignment of counties involved in the data collection. Instead, counties voluntarily participated in the collection and submission of data. The data were analyzed using a chi square statistical analysis. Results indicated that there was a highly significant statistical difference in a positive direction between the responses of the more experienced 4-H members surveyed and the members with two years experience and less on all six life skills measured. However, additional studies may be conducted to determine whether the difference is due to 4-H participation or general increase in maturity.

#### **Key Items of Evaluation**

With the institution of a new planning and reporting system in Colorado, we are still refining the collection of data. As we do so, the measures of outcomes will change, as well as become more precise. As we continue to evolve this system, the data will more fully reflect the outcomes we are looking for.

**Program #2****V(A). Planned Program (Summary)****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	9%		10%	
801	Individual and Family Resource Management	18%		20%	
802	Human Development and Family Well-Being	54%		50%	
803	Sociological and Technological Change Affecting Individuals, Families and Communities	3%		0%	
804	Human Environmental Issues Concerning Apparel, Textiles, and Residential and Commercial Structures	5%		10%	
805	Community Institutions, Health, and Social Services	11%		10%	
	<b>Total</b>	<b>100%</b>		<b>100%</b>	

**V(C). Planned Program (Inputs)****1. Actual amount of professional FTE/SYs expended this Program**

Year: 2008	Extension		Research	
	1862	1890	1862	1890
<b>Plan</b>	20.0	0.0	0.0	0.0
<b>Actual</b>	11.6	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
205451	0	0	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
205451	0	0	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
505320	0	0	0

**V(D). Planned Program (Activity)****1. Brief description of the Activity**

Educational activities include:

•Adaption 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 radon and carbon monoxide education for agents first, then the general public, builders, realtors, homeowner's associations, and home owners.

**2. Brief description of the target audience**

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**

**Target for the number of persons (contacts) reached through direct and indirect contact methods**

	<b>Direct Contacts Adults</b>	<b>Indirect Contacts Adults</b>	<b>Direct Contacts Youth</b>	<b>Indirect Contacts Youth</b>
<b>Year</b>	<b>Target</b>	<b>Target</b>	<b>Target</b>	<b>Target</b>
<b>Plan</b>	1500	6000	0	0
2008	174617	327207	1303	0

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

**Patent Applications Submitted**

<b>Year</b>	<b>Target</b>
<b>Plan:</b>	0
2008 :	0

**Patents listed**

**3. Publications (Standard General Output Measure)**

**Number of Peer Reviewed Publications**

	<b>Extension</b>	<b>Research</b>	<b>Total</b>
<b>Plan</b>	0	0	
2008	9	0	0

**V(F). State Defined Outputs**

**Output Target**

**Output #1****Output Measure**

- Number of trainings held on indoor air quality issues.

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2008	15	80

**Output #2****Output Measure**

- Number of parenting programs held.

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2008	20	170

**Output #3****Output Measure**

- Agrability workshops held.

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2008	10	20

**Output #4****Output Measure**

- Trainings held for couples/parents on communications skills and raising a secure child.

*Not reporting on this Output for this Annual Report*

**Output #5****Output Measure**

- Number of trainings held for care providers.

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2008	10	118

**Output #6****Output Measure**

- Trainings held in family financial management.

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2008	30	264

**Output #7****Output Measure**

- Number of volunteers supporting this work

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2008	{No Data Entered}	31

**Output #8****Output Measure**

- Number of agencies partnered with to support this work.

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2008	{No Data Entered}	203

**Output #9****Output Measure**

- Number of radon kits distributed

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2008	{No Data Entered}	1516

**Output #10****Output Measure**

- Grant dollars generated to support this work

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2008	{No Data Entered}	849965

**V(G). State Defined Outcomes**

**V. State Defined Outcomes Table of Content**

O No.	Outcome Name
1	Number of individuals trained
2	Percent of attendees gaining knowledge in the subject matter
3	Percent of participants changing attitudes as a result of the training
4	Percent of participants intending to change behavior as a result of the training.

**Outcome #1****1. Outcome Measures**

Number of individuals trained

*Not reporting on this Outcome for this Annual Report***Outcome #2****1. Outcome Measures**

Percent of attendees gaining knowledge in the subject matter

**2. Associated Institution Types**

•1862 Extension

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

Year	Quantitative Target	Actual
2008	70	93

**3c. Qualitative Outcome or Impact Statement****Issue (Who cares and Why)**

Radon is the second leading cause of lung cancer, behind smoking, in the United States. According to EPA radon level maps, parts of Colorado may have some of the highest levels in the country. Other indoor air quality issues lead to increased health problems.

**What has been done**

To educate the public and promote testing, CSU Extension expanded efforts to increase awareness of radon and options for mitigation, along with educational programs on air quality.

**Results**

2,142 persons were trained regarding potential home radon problems. 100percent reported increased knowledge of the situation; 48/49 (98 percent) learned about potential indoor air quality issues and solutions while 22/31 (71 percent) increased knowledge of problems with home mold situations.

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
801	Individual and Family Resource Management
723	Hazards to Human Health and Safety
805	Community Institutions, Health, and Social Services
802	Human Development and Family Well-Being
804	Human Environmental Issues Concerning Apparel, Textiles, and Residential and Commercial Structures
803	Sociological and Technological Change Affecting Individuals, Families and Communities

**Outcome #3****1. Outcome Measures**

Percent of participants changing attitudes as a result of the training

**2. Associated Institution Types**

•1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

Year	Quantitative Target	Actual
2008	60	89

**3c. Qualitative Outcome or Impact Statement****Issue (Who cares and Why)**

Concern over finances increased in many areas of personal, home and business during 2008. With the economic downturn, media accounts of foreclosures, layoffs and closing businesses have dominated nearly everyone's attention. Because of these and additional factors, Colorado residents have an increased interest in creating financial goals, taking action to prevent identity theft and review their credit reports. Business owners are looking for answers to the challenges of an unstable economy.

**What has been done**

A county-wide Financial Literacy Summit was planned for Larimer and neighboring county business owners, educators, government personnel, financial institutions and others involved in helping direct financial literacy efforts. Larimer County commissioners supported the summit with financial support. United Way was a partner in the outreach effort. The goal of the summit was to create a setting to discuss the status of financial literacy, develop strategies for increasing literacy efforts, and show participants quality low or no cost, easily accessed programs and materials to be used to increase financial literacy. A long-term goal is to decrease reliance on payday loans, pawn shops, check cashing service for high cost credit, help consumers increase the amount of their emergency savings and fewer people experiencing bankruptcy and/or home or business foreclosure.

**Results**

128 people registered for the one-day summit; 109 participated, seeking additional information. Two state legislators and one county commissioner participated in all or part of the day. The summit produced a committed and motivated group of people willing to continue strategic planning on financial literacy. They also agreed to be involved in their local communities during America Saves Week activities.

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
723	Hazards to Human Health and Safety
802	Human Development and Family Well-Being
805	Community Institutions, Health, and Social Services
804	Human Environmental Issues Concerning Apparel, Textiles, and Residential and Commercial Structures
801	Individual and Family Resource Management
803	Sociological and Technological Change Affecting Individuals, Families and Communities

**Outcome #4****1. Outcome Measures**

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

**2. Associated Institution Types**

•1862 Extension

**3a. Outcome Type:**

Change in Condition Outcome Measure

**3b. Quantitative Outcome**

Year	Quantitative Target	Actual
2008	50	80

**3c. Qualitative Outcome or Impact Statement****Issue (Who cares and Why)**

The number of family caregivers of children has been steadily on the rise both nationally and in Colorado. In particular, grandparents raising grandchildren have increased pressures on their financial and emotional resources.

**What has been done**

A statewide network of Extension agents and agency professionals have organized their efforts to provide outreach to grandparents raising grandchildren, including a newly-developed website for online support: [www.ext.colostate.edu/grg/index.html](http://www.ext.colostate.edu/grg/index.html). The site includes links to Extension and agency resources, assistance and benefits, a grandparent's Web log, and other support tools. In Larimer County, the Larimer County Alliance for Grandfamilies (LCAG) was formed. Because of Larimer County's proximity to Colorado State University (CSU) graduate and undergraduate students have conducted literature reviews, coordinated focus groups and gathered information on local and state resources.

**Results**

Participants at an evaluation session of LCAG reported that they thought LCAG had increased community awareness of grandfamilies issues, built partnerships, and empowered grandparents. They also indicated that because of LCAG they had better knowledge of the services and best practices for grandfamilies, increased ability to solve and respond to grandfamily problems, an increased knowledge of resources and public policy related to grandfamilies along with the skill to help influence policies and the importance of establishing partnerships.

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
802	Human Development and Family Well-Being
801	Individual and Family Resource Management
805	Community Institutions, Health, and Social Services
723	Hazards to Human Health and Safety
804	Human Environmental Issues Concerning Apparel, Textiles, and Residential and Commercial Structures
803	Sociological and Technological Change Affecting Individuals, Families and Communities

**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**

- A specialist who was on sabbatical last year, has returned and the numbers now reflect his additional programming.
- We continue to refine reporting to capture more complete and accurate data.
- As the economic downturn continues, the need and demand for additional programming in family resource management is significant. Program priorities are likely to change to reflect this demand.
- With changes in the demographics of the state, our audience may change significantly to reflect a larger percentage of hispanic and other ethnically diverse individuals and families in our communities.

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

##### **1. Evaluation Studies Planned**

- After Only (post program)
- Before-After (before and after program)
- During (during program)
- Case Study
- Comparison between locales where the program operates and sites without program intervention

##### **Evaluation Results**

Core Competency Area (CCA) work teams are focusing their efforts as a CCA group, in anticipation of being able to more accurately evaluate success and effectively report outcomes.

##### **Key Items of Evaluation**

Colorado State University no longer offers a major in Family Economics, and we are without a Family Resource Specialist. This compromises our ability to respond as the need for financial/economic education becomes demanding.

**Program #3****V(A). Planned Program (Summary)****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	77%		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.	1%		10%	
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occuring Toxins	7%		20%	
724	Healthy Lifestyle	10%		0%	
805	Community Institutions, Health, and Social Services	0%		10%	
	<b>Total</b>	<b>100%</b>		<b>100%</b>	

**V(C). Planned Program (Inputs)****1. Actual amount of professional FTE/SYs expended this Program**

Year: 2008	Extension		Research	
	1862	1890	1862	1890
<b>Plan</b>	24.0	0.0	7.0	0.0
<b>Actual</b>	32.1	0.0	8.1	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
569495	0	657021	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
569495	0	657021	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
1400710	0	162700	0

**V(D). Planned Program (Activity)****1. Brief description of the Activity**

**Food Safety Education**

- 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.)
- Food Safety Training for Food Service Managers and Workers (Food Safety Works, ServSafe, Food Safety for Food Bank Workers).

**Health Promotion/Chronic Disease Prevention**

- Multi-lesson series - 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
- Self-paced program - Self-Care for a Healthy Heart
- Single lessons - Workable Wellness (worksite wellness).
- Youth program- Food Friends-Making New Foods Fun for Kids, Eating Right Is Basic, Chef Combo's Fantastic Adventures in Tasting and Nutrition, Professor Popcorn

**Research**

- Technical and extension publications
- Development of new technologies for improving food safety
- 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**

**Target for the number of persons (contacts) reached through direct and indirect contact methods**

	<b>Direct Contacts Adults</b>	<b>Indirect Contacts Adults</b>	<b>Direct Contacts Youth</b>	<b>Indirect Contacts Youth</b>
<b>Year</b>	<b>Target</b>	<b>Target</b>	<b>Target</b>	<b>Target</b>
<b>Plan</b>	3500	150000	250	1000
2008	66435	602557	8250	0

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

**Patent Applications Submitted**

<b>Year</b>	<b>Target</b>
<b>Plan:</b>	0
2008 :	0

**Patents listed**

**3. Publications (Standard General Output Measure)**

**Number of Peer Reviewed Publications**

	<b>Extension</b>	<b>Research</b>	<b>Total</b>
<b>Plan</b>	0	0	
2008	38	107	145

**V(F). State Defined Outputs****Output Target****Output #1****Output Measure**

- Number of trainings in Food Safety Education, Food Security, Health Promotion and Disease Prevention held.

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2008	25	1544

**Output #2****Output Measure**

- Amount of grant dollars received to support Nutrition, Health and Food Safety

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2008	25000	3656677

**Output #3****Output Measure**

- Number of newsletters on Food Safety Education, Food Security, and Health Promotion and Disease Prevention distributed.

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2008	25000	602557

**Output #4****Output Measure**

- Technical publications on food safety and nutrition.

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2008	20	38

**Output #5****Output Measure**

- Number of volunteers supporting nutrition and food safety work

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2008	{No Data Entered}	235

**Output #6****Output Measure**

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

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2008	{No Data Entered}	26

**Output #7****Output Measure**

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

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2008	{No Data Entered}	306

**Output #8****Output Measure**

- Number of individuals trained via workshops

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2008	{No Data Entered}	26277

**V(G). State Defined Outcomes**

**V. State Defined Outcomes Table of Content**

O No.	Outcome Name
1	Percent of participants at trainings indicating an increase in knowledge gained
2	Percent of participants reporting a change in attitude regarding the training topic
3	Percent of participants indicating a change in behavior as a result of the training
4	Number of participants at the trainings

**Outcome #1****1. Outcome Measures**

Percent of participants at trainings 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
2008	50	94

**3c. Qualitative Outcome or Impact Statement****Issue (Who cares and Why)**

The number of persons with type 2 diabetes in Colorado has increased over 70 percent in the past ten years. The Colorado Department of Public Health and Environment (CDPHE) estimates that 143,000 adults are diagnosed with diabetes, but another 74,200 are likely to have the disease and not know it. Poor dietary habits and physical inactivity are contributors to the chronic diseases such as diabetes. Only 25 percent of Coloradans eat the recommended 5 or more servings of fruits and vegetables, while 54percent meet the recommended physical activity guidelines for moderate (30 minutes per day, 5 or more days per week) or vigorous (20 minutes per day, 3 or more days per week).

**What has been done**

Colorado State University Extension has two programs, Dining with Diabetes and Small Changes Make a Big Difference, which reach those who are have pre-diabetes, who have been diagnosed with diabetes, who have a family history of diabetes and who are care-givers of those who have diabetes. Programming focuses on improving knowledge of healthful food choices, increasing awareness of the importance of physical activity, and avoidance of diabetes complications.

**Results**

During FY 2008 Extension agents reached 529 participants with diabetes education programming. Evaluation results indicate that 94percent of participants are aware that diabetes is a risk factor for other chronic diseases, such as coronary heart disease; 75percent intended to make a change in their food choices, and 64percent intended to be physically active for 30 minutes each day. Program participants reported greater confidence in preparing meals for their diabetes. Overall, these programs fill a void in many local communities. Participant comments illustrate the knowledge that has been gained from these classes:

- \* "Cooking the diabetic way tastes good!"
- \* "I learned that carbs are OK and how to plan menus using carbs, protein and fruit."

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occuring Toxins
805	Community Institutions, Health, and Social Services
703	Nutrition Education and Behavior
704	Nutrition and Hunger in the Population
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources.
724	Healthy Lifestyle

**Outcome #2**

**1. Outcome Measures**

Percent of participants reporting a change in attitude regarding the training topic

**2. Associated Institution Types**

•1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

Year	Quantitative Target	Actual
2008	50	71

**3c. Qualitative Outcome or Impact Statement****Issue (Who cares and Why)**

In the U.S. 10 million individuals, 80 percent of whom are women, are estimated to have osteoporosis and almost 34 million more are estimated to have low bone mass, placing them at increased risk for the disease. Half of women over age 50 will have an osteoporosis-related fracture in their life.

**What has been done**

Provided the necessary educational materials and training to fitness professionals to help them successfully implement and maintain the StrongWomen(tm) Program.

-Facilitated the implementation of the StrongWomen(tm) Program in community and senior centers, local health and fitness facilities, hospitals and clinics, university extension services, businesses, and any other place where middle-aged and older women come together.

-Improved the health and well-being of middle-aged and older women by increasing access to structured, safe, and effective strength training programs.

**Results**

71percent of participants who completed an evaluation reported they felt physically stronger. Comments from participants show the benefit of the program. One participant used a walker to come to the program from her apartment in the senior housing complex but was able to do the exercises because of the support of the chair. But, she always needed to use her hands to push herself up from the chair when getting ready to stand. One day she was so excited about her progress that she called her daughter to tell her she had been able to actually stand from the chair without using her hands twice that day.

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
805	Community Institutions, Health, and Social Services
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occuring Toxins
703	Nutrition Education and Behavior
704	Nutrition and Hunger in the Population
724	Healthy Lifestyle
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources.

**Outcome #3****1. Outcome Measures**

Percent of participants indicating a change in behavior as a result of the training

**2. Associated Institution Types**

•1862 Extension

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

Year	Quantitative Target	Actual
2008	50	62

**3c. Qualitative Outcome or Impact Statement****Issue (Who cares and Why)**

More than 250,700 Coloradans received Food Assistance Program benefits each month, an increase of 40.5% during the past five years. Additionally, more than 600,000 residents are estimated to be eligible for participation, with more than half classified as working poor.

**What has been done**

Colorado State University Extension employs 10 Food Assistance Nutrition Education (FANE) agents, who with campus research specialist support work throughout the state to deliver high quality nutrition education. Content includes dietary quality and food preparation, food resource management, and food safety concepts. Evaluated curricula are used for class series and most single events. Additional agents provide valuable support to this program through local county Extension offices. In the San Luis Valley, Extension's Healthy Habits Network continues to work collaboratively to bring people together around healthful food.

**Results**

During FY 2008 Extension-based nutrition education reached 2,919 adults and 118 youth with direct education. An additional 3,612 low-income persons were reached through the Healthy Habits Network Farmer's Market project. Indirectly, FANE agents made 170,946 nutrition education contacts through displays and newsletters. The nutrition education quality, however, was best expressed by a couple success stories. Brigid on the Bus was a 6-week program targeting seniors with nutrition education surrounding their regular grocery shopping trips. This innovative program reached participants who otherwise would not have attended a traditional class.

\* 83% use a grocery list more often; 50% reported eating more fruits and vegetables each day.

\* "I hate to see these [classes] end. They've been the highlight of my week. I loved the talk before shopping and helping me to read the labels and pick the good foods. I use the recipes and have been cooking more instead of buying frozen meals. Thanks Brigid and Kerri!"

The actual percent of participants reporting behavior change/use of skills (above) represents data combined from multiple program delivered by the Health Promotions Work Team.

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
703	Nutrition Education and Behavior
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occuring Toxins
805	Community Institutions, Health, and Social Services
704	Nutrition and Hunger in the Population
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources.
724	Healthy Lifestyle

**Outcome #4****1. Outcome Measures**

Number of participants at the trainings

*Not reporting on this Outcome for this Annual Report*

## **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**

Competing program priorities result in nutrition educators reporting more than 1 FTE in order to meet the needs of families and individuals. As budgets remain tight, counties question duplication of service and the need for Extension nutrition programs. In spite of this county threat, agents and specialists work well together and continue to meet the needs of stakeholders.

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

### **1. Evaluation Studies Planned**

- After Only (post program)
- Before-After (before and after program)
- During (during program)
- Time series (multiple points before and after program)

### **Evaluation Results**

- 44% of participants who completed a nutrition class series increased fruit and vegetable or low-fat dairy consumption,
- 66% of participants who completed a nutrition class series with physical activity content increased their physical activity by 30 minutes/day.
- 74% of participants who completed a nutrition class series including resource management concepts improved at least one food resource management practice.

### **Key Items of Evaluation**

This is a very successful Core Competency Area (CCA) with work teams collecting, analyzing, and reporting quality impact data.

**Program #4****V(A). Planned Program (Summary)****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	5%		10%	
302	Nutrient Utilization in Animals	4%		10%	
303	Genetic Improvement of Animals	1%		20%	
305	Animal Physiological Processes	1%		0%	
307	Animal Management Systems	52%		30%	
311	Animal Diseases	2%		10%	
315	Animal Welfare/Well-Being and Protection	8%		10%	
601	Economics of Agricultural Production and Farm Management	27%		10%	
	<b>Total</b>	100%		100%	

**V(C). Planned Program (Inputs)****1. Actual amount of professional FTE/SYs expended this Program**

Year: 2008	Extension		Research	
	1862	1890	1862	1890
<b>Plan</b>	15.0	0.0	9.5	0.0
<b>Actual</b>	14.0	0.0	7.1	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
249435	0	866600	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
249435	0	866600	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
613502	0	549860	0

**V(D). Planned Program (Activity)****1. Brief description of the Activity**

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

**2. Brief description of the target audience**

Individual agricultural producers, commodity groups, agri-business partners

**V(E). Planned Program (Outputs)**

**1. Standard output measures**

**Target for the number of persons (contacts) reached through direct and indirect contact methods**

	<b>Direct Contacts Adults</b>	<b>Indirect Contacts Adults</b>	<b>Direct Contacts Youth</b>	<b>Indirect Contacts Youth</b>
<b>Year</b>	<b>Target</b>	<b>Target</b>	<b>Target</b>	<b>Target</b>
<b>Plan</b>	800	5000	2500	2500
2008	57659	15851	240	0

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

**Patent Applications Submitted**

**Year    Target**

**Plan:    0**

2008 :    0

**Patents listed**

**3. Publications (Standard General Output Measure)**

**Number of Peer Reviewed Publications**

	<b>Extension</b>	<b>Research</b>	<b>Total</b>
<b>Plan</b>	0	0	
2008	24	66	90

**V(F). State Defined Outputs**

**Output Target**

**Output #1**

**Output Measure**

- Number of attendees at workshops/trainings/field days
 

Year	Target	Actual
2008	500	9284

**Output #2**

**Output Measure**

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

Year	Target	Actual
2008	30000	1710764

**Output #3**

**Output Measure**

- Number of technical and refereed journal articles published
 

Year	Target	Actual
2008	20	90

**Output #4**

**Output Measure**

- Number of volunteers supporting this work
 

Year	Target	Actual
2008	{No Data Entered}	224

**Output #5**

**Output Measure**

- New technologies adopted by producers.
 

Year	Target	Actual
2008	{No Data Entered}	10

**Output #6**

**Output Measure**

- Number of agencies partnering in this program effort.
 

Year	Target	Actual
2008	{No Data Entered}	83

**V(G). State Defined Outcomes****V. State Defined Outcomes Table of Content**

O No.	Outcome Name
1	Number 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	Genetic Evaluation and Improvement of Livestock
5	Economics of animal feed sources

**Outcome #1****1. Outcome Measures**

Number 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
2008	60	64

**3c. Qualitative Outcome or Impact Statement****Issue (Who cares and Why)**

The impact of agriculture or any other economic sector is not limited to its own activities. Every dollar generated or person employed has the potential to stimulate more income and more jobs know as the "multiplier effect."

**What has been done**

Young ranchers can be an under-served audience due to their time constraints and limited funds. Some programs were held in the evening for better attendance by young ranchers and some had external sponsorship, such as Beef Check-off funds, in order to be affordable for young families.

**Results**

64 percent of participants who completed evaluations reported that they gained knowledge during training and other educational opportunities provided by the Beef Work Team. Content areas included:

- \* Marketing
- \* Reproduction
- \* Nutrition
- \* General Management
- \* Animal handling
- \* People management
- \* Meats
- \* Range management
- \* Economics
- \* Health
- \* Environment

**4. Associated Knowledge Areas**

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

**Outcome #2****1. Outcome Measures**

Percent of participants indicating change in behavior/ best practices adopted

**2. Associated Institution Types**

•1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

Year	Quantitative Target	Actual
2008	50	42

**3c. Qualitative Outcome or Impact Statement****Issue (Who cares and Why)**

Proper rangeland management and monitoring of rangeland conditions can be valuable component for the sustainability of ranches in Eastern Colorado, and on the Western Slope. Proper rangeland management can increase plant production and species diversity to provide for the nutritional needs of animals.

**What has been done**

Colorado State University Extension developed and/or assisted with programs to teach producers the importance of range management and how to monitor ecological changes each year and over the course of decades. Many producers expressed learning a great deal and having a change in how they viewed the capability of their land. Some producers had a change in action by beginning to monitor on their land and/or changing the methodology of how they are currently monitoring in order to receive more useful data.

**Results**

34 percent of participants who completed evaluations indicated they changed behavior/adopted best practices in range management following a workshop or other educational opportunity presented by the Beef Team.

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
302	Nutrient Utilization in Animals
303	Genetic Improvement of Animals
301	Reproductive Performance of Animals
601	Economics of Agricultural Production and Farm Management
311	Animal Diseases
307	Animal Management Systems
315	Animal Welfare/Well-Being and Protection
305	Animal Physiological Processes

**Outcome #3****1. Outcome Measures**

Economic impact of the change in behavior reported

**2. Associated Institution Types**

•1862 Research

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

Year	Quantitative Target	Actual
2008	300000	7000000

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

The decision support system we have developed for the cow/calf producer is designed to be used by producers to evaluate sire selection decisions based on the impact those sires' progeny might have on the profitability of the specific producers operation.

**What has been done**

Currently, there are seven participating breed associations that have contributed expected progeny differences for use in the decision support system. Additionally, we are developing breed-wide selection indexes using this system for release to entire breeds and their customers. These will be simultaneously released with the expected progeny differences twice per year. Given that this single association transfers over 6500 bulls in a single year, assuming bulls are used for 3 breeding seasons, each of these animals could produce upwards of 75 progeny for a total of nearly 500,000 offspring.

**Results**

If use of this system results in the selection of bulls whose progeny are more profitable, the result would be a considerable improvement for the customers of this breed. Magnified over 6 additional breeds and the results become more important. Given the 700,000 plus cows in Colorado, an improvement of \$10 per head would result in an improvement of seven million dollars net revenue. Additionally we continue to disseminate information on beef production systems through the CSUBeef.com website and we perform background research into novel traits that could potentially be incorporated in the decision support system.

See Crews, D. H., Jr., S. S. Moore, and R. M. Enns. 2008. Optimizing traditional and marker assisted evaluation in beef cattle. Pp. 44-49 and Enns, R. M. and D. H. Crews, Jr. 2008. New trait development and economic relevance in national cattle evaluation. Pp. 40-43. Proceedings, 40th Beef Improvement Federation Research Symposium and Annual Meeting, Calgary, AB.

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
307	Animal Management Systems
601	Economics of Agricultural Production and Farm Management
301	Reproductive Performance of Animals

**Outcome #4****1. Outcome Measures**

Genetic Evaluation and Improvement of Livestock

**2. Associated Institution Types**

•1862 Research

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

Year	Quantitative Target	Actual
2008	{No Data Entered}	4000000

**3c. Qualitative Outcome or Impact Statement****Issue (Who cares and Why)**

Research into genetic improvement methods is focused on development and improvement of EPD for traits directly related to production costs and income. One specific area addressed has been development of better methods to genetic evaluate and select for improved reproductive ability.

**What has been done**

The methodologies developed for the genetic evaluation of beef cow stayability have resulted in higher accuracies of selection of animals at earlier ages. Additionally, the new approach to defining stayability where a successful cow must produce a calf every year to six years of age, resulted in an expected progeny difference that focuses on reproductive ability.

#### Results

There are approximately 32 million beef cows in the United States and 730,000 in Colorado. An improvement of only 1% in conception rates could conceivably result in an additional \$176 million nationally and \$4 million for Colorado in increased revenue to beef cattle producers. This new tool has been adopted by beef breed associations for which Colorado State University provides genetic evaluation services through its Center for Genetic Evaluation of Livestock. These tools are then made available to both seedstock and commercial breeders using bulls selected with these tools.

Enns, R. M. and G. B. Nicoll. 2008. Genetic change results from selection on an economic breeding objective in beef cattle. *Journal of Animal Science*. 86:3348-3357.

#### 4. Associated Knowledge Areas

KA Code	Knowledge Area
307	Animal Management Systems
303	Genetic Improvement of Animals
601	Economics of Agricultural Production and Farm Management
301	Reproductive Performance of Animals

#### Outcome #5

##### 1. Outcome Measures

Economics of animal feed sources

##### 2. Associated Institution Types

•1862 Research

##### 3a. Outcome Type:

Change in Knowledge Outcome Measure

##### 3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	{No Data Entered}	0

##### 3c. Qualitative Outcome or Impact Statement

###### Issue (Who cares and Why)

What is the impact of using dried distillers grains as feed supplements on pregnant beef cows?

###### What has been done

A study was conducted to evaluate the effects of dried distiller's grains with solubles (DDGS), fed as a supplement to pregnant beef cows, on the performance, serum urea nitrogen (SUN), and trace mineral status of the cows and their offspring.

###### Results

Feeding DDGS in lieu of the range cubes netted a \$13.86/cow savings over the duration of this 77-d trial. Supplementing pregnant range cows on winter range with DDGS improved cow performance, trace mineral status, and had a tendency to increase calf birth wt. Establishing the effects of supplementing the pregnant beef cow diet with DDGS will provide cow-calf producers with management tools in those areas of the country where availability of distiller's grains are prevalent. When distiller's grains are competitively priced (on a DM basis) among alternative protein and energy supplements, cow-calf producers should consider not only the cost benefit but the additional performance that could be achieved by feeding DDGS.

Archibeque, S. L., H. C. Freeltly, and C. L. Ferrell. 2008. Feeding distillers grains supplements to improve amino acid nutriture of lambs consuming moderate-quality forages. *J. Anim. Sci.* 86:691-701.

#### 4. Associated Knowledge Areas

KA Code	Knowledge Area
302	Nutrient Utilization in Animals
301	Reproductive Performance of Animals

#### 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

- Individuals' ability to attend fee-for-service programs may have been impacted by economic downturns.
- Extensions's ability to provide programming and scholarships for these programs may have been impacted as appropriations continue to decrease and staff is lost.
- Drought in the southwest part of Colorado may have impacted individual producer's ability to remain viable.

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

##### 1. Evaluation Studies Planned

- After Only (post program)
- Before-After (before and after program)
- During (during program)
- Case Study

##### Evaluation Results

As we continue to refine our reporting template, results may actually be higher than we are currently able to report.

As we become more precise in our reporting template, we continue to have more accurate information to report. However, we do need to include more opportunity to report long-term evaluation studies on the economic benefits of this work.

##### Key Items of Evaluation

Because the Colorado State University Extension Core Competency Areas (CCA) are aligned with program delivery not with Federal reporting categories, there can be imprecision in reporting, especially between animal production systems and plant production systems. This disconnect is continually under review and revision.

**Program #5****V(A). Planned Program (Summary)****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%	
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants	4%		10%	
204	Plant Product Quality and Utility (Preharvest)	2%		0%	
205	Plant Management Systems	45%		20%	
206	Basic Plant Biology	5%		10%	
211	Insects, Mites, and Other Arthropods Affecting Plants	4%		10%	
212	Pathogens and Nematodes Affecting Plants	4%		10%	
213	Weeds Affecting Plants	11%		10%	
215	Biological Control of Pests Affecting Plants	2%		10%	
216	Integrated Pest Management Systems	23%		10%	
	<b>Total</b>	<b>100%</b>		<b>100%</b>	

**V(C). Planned Program (Inputs)****1. Actual amount of professional FTE/SYs expended this Program**

Year: 2008	Extension		Research	
	1862	1890	1862	1890
<b>Plan</b>	21.0	0.0	36.0	0.0
<b>Actual</b>	15.0	0.0	17.0	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
370171	0	1150958	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
370171	0	1150958	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
910461	0	2501097	0

**V(D). Planned Program (Activity)****1. Brief description of the Activity**

- Conduct basic and applied research in plant productions systems.

- Develop and deliver workshops and educational classes for producers. •Utilize demonstration plots and field days to communicate program results. •Counsel with individual 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**

**Target for the number of persons (contacts) reached through direct and indirect contact methods**

	<b>Direct Contacts Adults</b>	<b>Indirect Contacts Adults</b>	<b>Direct Contacts Youth</b>	<b>Indirect Contacts Youth</b>
<b>Year</b>	<b>Target</b>	<b>Target</b>	<b>Target</b>	<b>Target</b>
<b>Plan</b>	800	5000	0	0
2008	57875	381227	328	0

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

**Patent Applications Submitted**

<b>Year</b>	<b>Target</b>
<b>Plan:</b>	0
2008 :	0

**Patents listed**

**3. Publications (Standard General Output Measure)**

**Number of Peer Reviewed Publications**

	<b>Extension</b>	<b>Research</b>	<b>Total</b>
<b>Plan</b>	0	0	
2008	40	176	206

**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.

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2008	2	143

**Output #2****Output Measure**

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

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2008	600	17988

**Output #3****Output Measure**

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

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2008	25000	2927604

**Output #4****Output Measure**

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

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2008	25	40

**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

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2008	50	337

**Output #6****Output Measure**

- Number of volunteers supporting plant production systems work

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2008	{No Data Entered}	167

**Output #7****Output Measure**

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

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2008	{No Data Entered}	131

**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	Cultivar releases
6	Weed Management
7	Chemical, cultural and biological controls
8	Adoption of improved wheat cultivars
9	Growth of Hops Industry
10	Production Management Guidelines for Potatoes
11	Selections for 'Plant Select' labeling
12	Improving acceptance of certified potato seed acreage

**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

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

Year	Quantitative Target	Actual
2008	50	0

**3c. Qualitative Outcome or Impact Statement****Issue (Who cares and Why)**

Sustainable Colorado farms and ranches are founded on principles of environmental health, economic profitability, and enhancing local communities. Farms must be profitable enough to provide an adequate return on the management, labor, and investment inputs as well as to provide investment capital for adapting to changing trends in markets and societal values. Sustainable agricultural business practices must also include enhancing the productivity of soils and the surrounding natural and social environment, as well as increasing biodiversity on the farm.

**What has been done**

Boulder Building Farmers Program, Market Farm Track

**Results**

Participants who completed evaluation from Boulder Building Farmers Program, Market Farm Track reported:

- o 100percent would implement more detailed recordkeeping based on the program.
- o 75 percent would change their operation based on the program
- o 81 percent would create or edit a business plan based on the program

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
213	Weeds Affecting Plants
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Pathogens and Nematodes 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

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

Year	Quantitative Target	Actual
2008	50	67

**3c. Qualitative Outcome or Impact Statement****Issue (Who cares and Why)**

The relatively recent (2005) invasion and spread of this major pest (Japanese Beetle) of horticultural and agricultural plants, including turf, required the attention of government agencies and green industry in Colorado and the region.

**What has been done**

Formation of the Japanese Beetle Task Force combined efforts of disparate government and private groups to evaluate the scope of the problem and control efforts. Japanese beetle monitoring, trapping, management and education efforts (CSI = Crime Scene Investigation) have successfully used volunteers and state agencies to reach diverse audiences throughout Colorado to mitigate the impacts of this invasive pest.

**Results**

The Colorado Front Range Japanese Beetle Task Force utilized Colorado State University Extension Master Gardeners and Golf Course Superintendents as volunteers in setting up and monitoring Japanese beetle traps. 67 percent of participants who completed evaluations reported changes in behavior/use of skills as a result of participating in training and other education events provided by this work team.

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
205	Plant Management Systems
216	Integrated Pest Management Systems
213	Weeds Affecting Plants
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Pathogens and Nematodes Affecting Plants

**Outcome #3****1. Outcome Measures**

Economic impact of the change in behavior reported.

**2. Associated Institution Types**

•1862 Extension

**3a. Outcome Type:**

Change in Condition Outcome Measure

**3b. Quantitative Outcome**

Year	Quantitative Target	Actual
2008	150000	42110

**3c. Qualitative Outcome or Impact Statement****Issue (Who cares and Why)**

The relatively recent (2005) invasion and spread of this major pest (Japanese Beetle) of horticultural and agricultural plants, including turf, required the attention of government agencies and green industry in Colorado and the region.

**What has been done**

Formation of the Japanese Beetle Task Force combined efforts of disparate government and private groups to evaluate the scope of the problem and control efforts. Japanese beetle monitoring, trapping, management and education efforts (CSI = Crime Scene Investigation) have successfully used volunteers and state agencies to reach diverse audiences throughout Colorado to mitigate the impacts of this invasive pest.

#### Results

No measure of economic impact as a result of behavior change is available for individuals or communities. However, the use of volunteers allowed the task force to save over \$42,110 in wages and fuel.

#### 4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants
216	Integrated Pest Management Systems
212	Pathogens and Nematodes Affecting Plants
213	Weeds Affecting Plants

### Outcome #4

#### 1. Outcome Measures

Adoption of crop production technology as measured by agricultural statistics.

#### 2. Associated Institution Types

- 1862 Extension
- 1862 Research

#### 3a. Outcome Type:

Change in Condition Outcome Measure

#### 3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	1	56

#### 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

Certified seed usage in Colorado reached a new high in Fall 2007, with 30.4% of wheat acres. Recent increases are attributed to the adoption of Hatcher and to the reputations of the CSU Variety Testing Program and the local seed grower businessmen.

##### Results

\*Seed growers grew 850 acres of Registered seed production of the new CSU-developed wheat variety "Bill Brown". This will allow for fast adoption of this new hard red winter wheat and further increases in acreage planted to Certified seed.

\*Wheat acreage planted to CSU varieties represented 54% in 2007 and increased to 64% in 2008.

\*The new high yielding and high quality variety Hatcher was planted on 22% wheat acreage in 2008 by comparison to 7% in 2007.

#### 4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems
204	Plant Product Quality and Utility (Preharvest)

### Outcome #5

**1. Outcome Measures**

Cultivar releases

**2. Associated Institution Types**

•1862 Research

**3a. Outcome Type:**

Change in Condition Outcome Measure

**3b. Quantitative Outcome**

Year	Quantitative Target	Actual
2008	{No Data Entered}	1

**3c. Qualitative Outcome or Impact Statement****Issue (Who cares and Why)**

Dry edible bean is an important crop in the High Plains and Intermountain Western US. Production is limited by pathogens and yield potential of cultivars.

**What has been done**

A new multiple disease resistant pinto bean cultivar Croissant, was released to seed producers in 2008. A drought tolerant germplasm was released to provide breeders with germplasm to enhance dry bean production under limited rainfall or reduced irrigation.

**Results**

Brick, M. A., J. B. Ogg, S. P. Singh, H. F. Schwartz, J. J. Johnson, and M. A. Pastor-Corrales. 2008. Registration of drought tolerant, rust resistant, high yielding pinto bean germplasm line CO46348. Journal of Plant Registrations. 2:120-124.

Brick, M. A., Ogg, J. B., Schwartz, H. F., Johnson, J. J., Judson, F., Miklas, P., and Singh, S. P. 2008. Release of Croissant pinto Bean. Ann Rept. Bean Improv. Coop. 51:271.

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
201	Plant Genome, Genetics, and Genetic Mechanisms

**Outcome #6****1. Outcome Measures**

Weed Management

**2. Associated Institution Types**

- 1862 Extension
- 1862 Research

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

Year	Quantitative Target	Actual
2008	{No Data Entered}	0

**3c. Qualitative Outcome or Impact Statement****Issue (Who cares and Why)**

Characterize weed population dynamics for improved long-term weed management decision-making

**What has been done**

A long-term weed shift study in irrigated crops including corn shows that slow, subtle changes in weed dynamics occur when the same control method, such as only glyphosate use in Roundup Ready crops, is used year after year. We demonstrated that use of a reduced rate of a preemergence herbicide in such systems can improve both total weed control, crop yield, and economic return.

**Results**

Many corn producers have re-integrated soil applied herbicides into their production plans for two reasons. First, it greatly reduces early season weed competition and gives growers a wider time window in which to make the post emergence glyphosate applications. Second, the net return to the grower, after subtracting the added cost of the soil applied herbicide, is in the range of 25 to 50 dollars additional income per acre. For producers with large corn acreage, this represents a considerable boost in income on an annual basis. Results of this research project are shared with crop producers, crop consultants, and other interested parties via extension meetings, written materials, and presentations at professional meetings.

Westra, P., R. G. Wilson, S. D. Miller, P. W. Stahlman, G. W. Wicks, P. L. Chapman, J. Withrow, D. Legg, C. Alford, and T. A. Gaines. 2008. Weed population dynamics after six years under glyphosphate and conventional herbicide-based weed control strategies. *Crop Science* 48:1170-1177.

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
213	Weeds Affecting Plants

**Outcome #7****1. Outcome Measures**

Chemical, cultural and biological controls

**2. Associated Institution Types**

- 1862 Extension
- 1862 Research

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

Year	Quantitative Target	Actual
2008	{No Data Entered}	0

**3c. Qualitative Outcome or Impact Statement****Issue (Who cares and Why)**

Develop chemical, cultural and biological tactics to reduce impact of IYS virus, transmitted by thrips, on onions.

**What has been done**

A survey of red, yellow and white transplant cultivars originating in southwestern United States including Arizona, California and Texas were obtained from onion producers as they prepared to transplant the onions in Colorado fields during March to April from 2004 to 2008. During 2008, IYSV was detected in 100 per cent of senescing leaves and green scapes (with poorly developed umbels that were not tested) of bolted plants of Exacta; again highlighting the apparent tissue variability (and transitory nature) of IYSV titer and detection when comparing vegetative to reproductive growth stages of development.

**Results**

These surveys implicate incoming transplants as one of the potential early-season sources of the virus and thrips that must be addressed in the production of transplanted and surrounding seeded crops grown in states like Colorado. This consistent contamination of transplants can cost Colorado onion growers 1 to 2 million dollars more per year for additional applications of insecticides. This annual source of overwintered thrips and transmission of the virus to new onions can cost Colorado onion growers 3 to 5 million dollars for additional insecticide sprays and reduced yield. IYSV incidence was reduced 4 to 17 per cent, and jumbo yield was increased 11 to 54 percent by most of the Actigard treatments evaluated in a commercial field with moderate to severe disease pressure.

Schwartz, H. F., Otto, K., Szostek, S., Boateng, C., Cranshaw, W. S., Camper, M. A., and Mahaffey, L. 2008. Thrips and IYSV sources in Colorado onion production systems. Proc. 2008 National Allium Research Conference, Savannah, Georgia, Dec. 11-12, 2008. Pp. 44-47, Featured Oral Presentation.

#### 4. Associated Knowledge Areas

KA Code	Knowledge Area
212	Pathogens and Nematodes Affecting Plants
211	Insects, Mites, and Other Arthropods Affecting Plants
216	Integrated Pest Management Systems

### Outcome #8

#### 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
2008	{No Data Entered}	0

#### 3c. Qualitative Outcome or Impact Statement

##### Issue (Who cares and Why)

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 2008, experimental line CO03W239 was released as an improved cultivar named Thunder CL. Thunder CL is an awned, white-glumed, hard white winter wheat. Thunder CL has shown superior grain yield under both non-irrigated and irrigated production conditions in eastern Colorado. Thunder CL carries the Als1 gene conferring tolerance to imazamox herbicide, shows moderate resistance to wheat streak mosaic virus, stripe rust (*Puccinia striiformis* Westend.) and stem rust (caused by *Puccinia graminis* Pers.:Pers f. sp. *tritici* Eriks. & E. Henn), and shows superior milling and bread baking quality. Thunder CL is the only yield-competitive, dryland-adapted hard white Clearfield\* wheat cultivar available in the Great Plains.

##### Results

CSU-bred wheat cultivars account for nearly 60% of Colorado's 2.4 million acres (2008 crop) with the remaining acreage planted mostly with cultivars from university breeding programs in adjacent states. Since 1963, average wheat grain yields in Colorado have more than doubled with at least 50 percent of this increase attributed to improved cultivars. With regard to quality, estimates from Colorado wheat industry leaders indicate that end-use quality enhancements from cultivars developed at CSU provide an average of \$20 million per year increased income for Colorado wheat producers (83 million bushels x \$0.25 per bushel price increase; 2003 dollars).

Haley, S. D. et al. 2008. Registration of 'Bill Brown' wheat. J. Plant Reg. 2:218-223 and Johnson, J. J Making Better Decisions, 2008 Colorado Winter Wheat Variety Performance Trials. Colorado State University Agricultural Experiment Station Technical Report TR08-11.

#### 4. Associated Knowledge Areas

KA Code	Knowledge Area
201	Plant Genome, Genetics, and Genetic Mechanisms

### Outcome #9

#### 1. Outcome Measures

Growth of Hops Industry

#### 2. Associated Institution Types

- 1862 Extension
- 1862 Research

#### 3a. Outcome Type:

Change in Condition Outcome Measure

#### 3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	{No Data Entered}	0

#### 3c. Qualitative Outcome or Impact Statement

##### Issue (Who cares and Why)

Microbrewers need a consistent quality and economic source of hops from growers

##### What has been done

This project has been evaluating 20 different hops varieties, commonly used by craft breweries, to determine the commercial potential for organic production under irrigated conditions.

##### Results

Results indicate that approximately ten varieties produce a sufficient quantity and quality of hops to be commercially viable in the arid inter-mountain west. start of a commercial organic hops industry in western Colorado. In 2008, ten acres were planted and harvested for commercial production and an estimated 50 acres will be added in 2009. A hops production workshop, with an emphasis on organic production, was organized and held in Hotchkiss, Colorado, in July of 2008 and was attended by 70 participants. Approximately half of the attendees were brewery owners and/or brewers, mostly from Colorado but also from several neighboring states with interest in establishing hops production and supply agreements with area growers. These agreements will help bolster and grow the hops industry in the area and contribute to the economic sustainability of their small farms.

See, <http://scstest.agsci.colostate.edu/godin/index.html#presentations>, under the heading "Sustainable Hops Growing Workshop."

#### 4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems

### Outcome #10

**1. Outcome Measures**

Production Management Guidelines for Potatoes

**2. Associated Institution Types**

- 1862 Extension
- 1862 Research

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

Year	Quantitative Target	Actual
2008	{No Data Entered}	0

**3c. Qualitative Outcome or Impact Statement****Issue (Who cares and Why)**

Each potato cultivar has its own unique set of cultural management requirements. To realize the yield and quality potential of any cultivar, optimum management guidelines for that cultivar need to be followed. Canela Russet is a potato that produces quality tubers. The major drawback that prevented easy adoption of this cultivar was the long tuber dormancy and late field emergence.

**What has been done**

The effect of seed size and seed reconditioning on field emergence, stem number, tuber number, and yield and quality performance of Canela Russet was concluded in 2008.

**Results**

Results from 2008 studies indicated that reconditioning of the tubers between 10 to 13 degrees Celcius for 14 days before planting enhanced field emergence; and cutting the seed to a size of 85-100g increased tuber yield. With these findings, growers of Canela Russet are able to harvest the crop earlier than before, and therefore avoid the potential of frost damage due to late harvest. Increased tuber yields have also been realized by growers.

See, Essah, S. Y. C. 2008. Overcoming obstacles in Canela Russet production. In: Proceedings of the Southern Rocky Mountain Agricultural Conference and Trade Fair, pp. 13-16 and Essah, S. Y. C., Delgado, J. A., Holm, D. G., and Davidson, R. D. 2008. Effect of seed size and seed reconditioning on the growth and yield of Canela Russet. In Annual Meetings Abstract. Potato Association of America. August 10-14. Buffalo, NY. U.S.A.

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
204	Plant Product Quality and Utility (Preharvest)
205	Plant Management Systems

**Outcome #11****1. Outcome Measures**

Selections for 'Plant Select' labeling

**2. Associated Institution Types**

- 1862 Extension
- 1862 Research

**3a. Outcome Type:**

Change in Condition Outcome Measure

**3b. Quantitative Outcome**

Year	Quantitative Target	Actual
2008	{No Data Entered}	0

**3c. Qualitative Outcome or Impact Statement****Issue (Who cares and Why)**

Specific performance results from annual herbaceous and woody plant trials help determine which new and superior annual flowers and herbaceous perennial varieties growers throughout the state and region should be grown and marketed.

**What has been done****Results**

In 2008, seven plant species were recommended or introduced by Plant Select. Over ninety demonstration gardens are displaying Plant Select plants throughout Colorado. Many vegetatively propagated varieties including calibrachoa, coleus, geranium, New Guinea impatiens, petunia, and verbena have become very important bedding plant crops in the state, due to this research. Plant Select plants which are either introductions or recommendations throughout the state and region means marketing more profitable plants for growers and retailers throughout the state and region. In 2008, over 1.8 million Plant Select labels were sold.

See, Klett, J. E. 2008. Plant Select for 2009. CSU Research Update, Colorado Green 24 (6): 16-17 and Klett, J. E. 2009 and others. Durable Plants for the Garden-A Plant Select Guide, Plant Select. Colorado State University, Denver Botanic Gardens and Green Industries of Colorado. Ed. James E. Henrick, Fulcrum Publishing. 209 p.

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
204	Plant Product Quality and Utility (Preharvest)
205	Plant Management Systems

**Outcome #12****1. Outcome Measures**

Improving acceptance of certified potato seed acreage

**2. Associated Institution Types**

- 1862 Extension
- 1862 Research

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

Year	Quantitative Target	Actual
2008	{No Data Entered}	0

**3c. Qualitative Outcome or Impact Statement****Issue (Who cares and Why)**

Potato Virus Y has been an ongoing disease threat and problem for both seed and commercial producers in Colorado. This disease is especially problematic in cultivars such as Russet Norkotah. PVY can reduce yields and size of tubers harvested and is instrumental in the majority of rejections from the Colorado certification program. Currently, 45% of the certified seed acreage in Colorado is grown to Russet Norkotah selections, about 2800 ha. This research impacts over 1700 ha of seed which is annually rejected for certification.

#### What has been done

#### Results

Findings of the PVY research indicate that certain cultivars such as Russet Norkotah tend to have a higher variance regarding PVY infection in the Post Harvest Testing than other less susceptible cultivars. Roguing infected plants from lots with higher levels of PVY tended to mechanically spread the virus to other nearby plants resulting in a situation where for each three infected plants rogued, there were an additional two plants infected but not visually evident. Finally, PVY symptom expression in Russet Norkotah was found to be transient, not latent, and expression occurred throughout the season. This trait by this cultivar makes it virtually impossible to effectively rogue out all PVY positive plants and leaves between 10-25% of the infected plants in the field after roguing is finished to act as late season inoculum sources within the field. Improved management of PVY can reduce rejections and result in additional \$2.5 to 3.5 million in revenue to the certified seed growers. Davidson, R. D., and A. J. Houser. 2008. 2008 Research Report, Extension Potato Disease Control Project, 65 pp.

#### 4. Associated Knowledge Areas

KA Code	Knowledge Area
212	Pathogens and Nematodes 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

• Individuals' ability to attend fee-for-service programs may have been impacted by economic downturns. • Extensions's ability to provide programming and scholarships for these programs may have been impacted as appropriations continue to decrease and staff is lost. • Drought in the southwest part of Colorado may have impacted individual producer's ability to remain viable.

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

##### 1. Evaluation Studies Planned

- After Only (post program)
- Before-After (before and after program)
- During (during program)
- Case Study

##### Evaluation Results

These Work Team reports do not fully represent the work completed or the results achieved. Formal evaluations may not have been conducted or results may not have been reported. These work teams will need additional evaluation support.

##### Key Items of Evaluation

Because the Colorado State University Extension Core Competency Areas (CCA) are aligned with program delivery not with Federal reporting categories, there can be imprecision in reporting, especially between animal production systems and plant production systems. This disconnect is continually under review and revision.

**Program #6**

**V(A). Planned Program (Summary)**

**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	0%		10%	
102	Soil, Plant, Water, Nutrient Relationships	29%		10%	
103	Management of Saline and Sodic Soils and Salinity	0%		10%	
111	Conservation and Efficient Use of Water	19%		20%	
112	Watershed Protection and Management	4%		10%	
121	Management of Range Resources	17%		10%	
122	Management and Control of Forest and Range Fires	1%		0%	
123	Management and Sustainability of Forest Resources	4%		10%	
124	Urban Forestry	8%		0%	
131	Alternative Uses of Land	16%		0%	
132	Weather and Climate	0%		10%	
134	Outdoor Recreation	2%		0%	
403	Waste Disposal, Recycling, and Reuse	0%		10%	
<b>Total</b>		<b>100%</b>		<b>100%</b>	

**V(C). Planned Program (Inputs)**

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

Year: 2008	Extension		Research	
	1862	1890	1862	1890
<b>Plan</b>	15.0	0.0	14.0	0.0
<b>Actual</b>	27.2	0.0	8.1	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
482412	0	1655074	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
482412	0	1655074	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
1186525	0	718152	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, commodity groups, regulatory agencies, agribusinesses, and local, state, and federal land management agencies.

**V(E). Planned Program (Outputs)****1. Standard output measures****Target for the number of persons (contacts) reached through direct and indirect contact methods**

	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Year	Target	Target	Target	Target
Plan	500	5000	0	0
2008	134944	327190	14357	0

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

Year Target

Plan: 0

2008 : 0

**Patents listed****3. Publications (Standard General Output Measure)****Number of Peer Reviewed Publications**

	Extension	Research	Total
Plan	0	0	
2008	17	128	145

**V(F). State Defined Outputs****Output Target**

**Output #1****Output Measure**

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

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2008	500	25090

**Output #2****Output Measure**

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

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2008	25000	9361923

**Output #3****Output Measure**

- Number of technical and refereed journal articles published.

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2008	25	17

**Output #4****Output Measure**

- Number of volunteers supporting this program

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2008	{No Data Entered}	2681

**Output #5****Output Measure**

- Number of partnering agencies supporting this program

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2008	{No Data Entered}	189

**Output #6****Output Measure**

- Number of new technologies adopted by producers

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2008	{No Data Entered}	13

**Output #7****Output Measure**

- Value of volunteers' time contributed to this program

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2008	{No Data Entered}	1236934

**Output #8****Output Measure**

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

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2008	{No Data Entered}	47000

**Output #9****Output Measure**

- Number of curriculum pieces developed and/or reviewed in support of this plan of work

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2008	{No Data Entered}	7

**V(G). State Defined Outcomes****V. State Defined Outcomes Table of Content**

O No.	Outcome Name
1	Number 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	Number of participants changing an attitude and intending to change as a result of this program
5	Percent of private wells increasing monitoring of water quality
6	Percent of participants changing behavior in small acreage management.
7	Improving Cropping Practices
8	Feasibility and economics of anaerobic digesters for the dairy industry
9	Water Management Tools

**Outcome #1****1. Outcome Measures**

Number 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
2008	60	78

**3c. Qualitative Outcome or Impact Statement****Issue (Who cares and Why)**

Management of weeds, insect pests and plant diseases is one of the most costly inputs that clientele in agriculture, the green industry and consuming households must finance every year in Colorado. A diverse and expanding pest complex requires enhanced management skills that often increase production costs. A conservative loss estimate of five to 10 percent due to plant pests could cost Colorado producers in urban and rural settings 50 to 100 million dollars annually.

**What has been done**

Programming/educational efforts delivered and evaluated by the Pest Management Work Team for increase in knowledge included the following topics: Pest Diagnosis; Pest Literacy;Pest Management Strategies;Improved Profitability with Timely Pest Management; and IPM Strategies for Crop Systems & Pest Complexes.

**Results**

Of participants who completed evaluation instruments following Pest Management programs, 84 percent report knowledge gained in topics above. This is one part of data that were combined for the actual number (78)reported above.

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
111	Conservation and Efficient Use of Water
123	Management and Sustainability of Forest Resources
112	Watershed Protection and Management
134	Outdoor Recreation
121	Management of Range Resources
122	Management and Control of Forest and Range Fires
131	Alternative Uses of Land
124	Urban Forestry

**Outcome #2****1. Outcome Measures**

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

**2. Associated Institution Types**

•1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

Year	Quantitative Target	Actual
2008	50	69

**3c. Qualitative Outcome or Impact Statement****Issue (Who cares and Why)**

The mission of the Native Plant Education team is to educate the public about native plants in order to foster stewardship, sustainable landscaping and management of weeds that threaten native ecosystems.

Management of weeds, insect pests and plant diseases is one of the most costly inputs that clientele in agriculture, the green industry and consuming households must finance every year in Colorado. A diverse and expanding pest complex requires enhanced management skills that often increase production costs. A conservative loss estimate of five to 10 percent due to plant pests could cost Colorado producers in urban and rural settings 50 to 100 million dollars annually. There is a long-term need for a comprehensive, high quality, integrated pest management system encompassing the disciplines of entomology, plant pathology and weed science. Pest activity and severity are dynamic and thus demand for management education and a systems approach will be ongoing. There is no other agency or organization that can assume the applied research and outreach Pest Management program of Bioagricultural Sciences & Pest Management in Colorado.

**What has been done**

In 2008 37 Native Plant Master courses (three four-hour sessions) were taught; 396 persons taught included those going on to volunteer and those choosing not to enter volunteer program.

Pest Management training and educational efforts that were evaluated for intention to change behavior included: Improved Timing of IPM Strategies; More Effective Management of Pests; Safe Use of Chemical Tools; Expanded Biosecurity Awareness and Invasive Pest Response; Change in current pest management program.

**Results**

74 percent reported beginning or increasing weed control efforts; 76 percent began planting or increased planting of native plants. 84 percent educated others about the value of native plants for landscaping and 80 percent went on to educate others about the impact of weeds on native plants. Over 1.1 million acres of land have been the target of weed control efforts.

Pest Management training evaluations show 67percent of participants reporting behavior change/use of skills as a result of training and other educational efforts.

These percentages were combined with others from this Core Competency Area to arrive at the percentage reported as actual (69, above).

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
131	Alternative Uses of Land
134	Outdoor Recreation
122	Management and Control of Forest and Range Fires
112	Watershed Protection and Management
124	Urban Forestry
121	Management of Range Resources
123	Management and Sustainability of Forest Resources
111	Conservation and Efficient Use of Water

**Outcome #3**

**1. Outcome Measures**

Economic impact of the change in behavior reported.

*Not reporting on this Outcome for this Annual Report*

**Outcome #4****1. Outcome Measures**

Number of participants changing an attitude and intending to change as a result of this program

**2. Associated Institution Types**

•1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

Year	Quantitative Target	Actual
2008	{No Data Entered}	64

**3c. Qualitative Outcome or Impact Statement****Issue (Who cares and Why)**

Small acreage management programs are designed to assist landowners in improving land stewardship, entrepreneurial applications for small acreages, management of animals, identification of best management practices for natural resources (land, water, air, plants, animals), and human resources needed to best manage small acreages.

**What has been done**

Training and other educational opportunities were provided, and evaluation data submitted, on these topics: Understanding of composting systems; Laws and regulations related to methane danger; Insect and disease ID and management; Irrigation water management; Soil and water testing procedures.

**Results**

63percent of participants who completed an evaluation reported they changed an attitude related to the following topics presented by the Small Acreage Work Team:

- \* Understanding of composting systems;
- \* Laws and regulations related to methane danger;
- \* Insect and disease ID and management;
- \* Irrigation water management;
- \* Soil and water testing procedures.

These data are part of those compiled for the actual percent (64) reported above.

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
111	Conservation and Efficient Use of Water
112	Watershed Protection and Management
131	Alternative Uses of Land
121	Management of Range Resources
102	Soil, Plant, Water, Nutrient Relationships
124	Urban Forestry
134	Outdoor Recreation
122	Management and Control of Forest and Range Fires
123	Management and Sustainability of Forest Resources

**Outcome #5**

Report Date 04/06/2009

**1. Outcome Measures**

Percent of private wells increasing monitoring of water quality

**2. Associated Institution Types**

•1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

Year	Quantitative Target	Actual
2008	{No Data Entered}	40

**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**

Through CSU Extension's partnership with the Northern Plains and Mountains Regional Water Program ([http://wsprod.colostate.edu/cwis435/northern\\_plains\\_mountains/1\\_Main\\_Page.htm](http://wsprod.colostate.edu/cwis435/northern_plains_mountains/1_Main_Page.htm)), two mini-grants were funded with regard to private wells and septic systems. Attendees had their wells tested to ensure water was potable and to screen for heavy metals and other contaminants that can impair human health. These workshops were held in Boulder and Teller Counties utilizing the CSU Private Well and Septic System Educational Package (<http://wsprod.colostate.edu/cwis435/WQ/privatewellpackag.htm>).

**Results**

These two mini-grants reported impact on 240 private wells with 40 percent reporting that they will increase monitoring of water quality of their wells. After the workshop participants also understood how septic functions and how to maintain them to prevent large economic costs for replacement due to failure or for contaminating the groundwater. Because of this program, increasing knowledge of testing increases the likely hood of testing private wells and detecting potential issues with water quality.

**4. Associated Knowledge Areas**

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

**Outcome #6****1. Outcome Measures**

Percent of participants changing behavior in small acreage management.

**2. Associated Institution Types**

•1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

Year	Quantitative Target	Actual
2008	{No Data Entered}	47

**3c. Qualitative Outcome or Impact Statement****Issue (Who cares and Why)**

Small acreage management programs are designed to assist landowners in improving land stewardship, entrepreneurial applications for small acreages, management of animals, identification of best management practices for natural resources (land, water, air, plants, animals), and human resources needed to best manage small acreages.

**What has been done**

The Small Acreage Management Work Team has delivered programs and other educational events and have provided evaluation data on topics including:

- \* Changes in management of small acreage;
- \* Had increase in Certified Weed Free hay producers;
- \* Create cooperative weed management area

**Results**

47 percent of participants who completed an evaluation indicated behavior change/use of skills in relation to:

- \*Changes in management of small acreage;
- \*Increase in Certified Weed Free hay producers;
- \*Create cooperative weed management area

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
131	Alternative Uses of Land
102	Soil, Plant, Water, Nutrient Relationships
121	Management of Range Resources

**Outcome #7****1. Outcome Measures**

Improving Cropping Practices

**2. Associated Institution Types**

- 1862 Research

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

Year	Quantitative Target	Actual
2008	{No Data Entered}	0

**3c. Qualitative Outcome or Impact Statement****Issue (Who cares and Why)**

This project seeks to advance understanding of biophysical processes in water limited agroecosystems and develop practices that promote long term sustainability. The project is carried out in two major agroecosystems, dryland cropping systems and limited irrigation cropping systems in the semiarid Eastern Plains of Colorado.

**What has been done**

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. 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. We have documented limited irrigation cropping systems water conservation as much as 350 mm yr-1 compared to fully irrigated corn while maintaining similar on-farm economic returns.

**Results**

These benefits have been realized for about 1,500,000 acres in Colorado 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. Benefits from limited irrigation have the potential to affect as much as 2,000,000 acres in Colorado. 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.

See, Hansen, N. C. 2008. Lower South Platte Irrigation Research and Demonstration Project. Colorado Water 25 (2):31-34; Helm, A., and N. Hansen. 2008. Crop Rotation that Reduce Fallow Frequency in Dryland Crop Rotations. From the Ground Up: Agronomy News 27 (4): 3-5; and Pritchett, J., J. Thorvaldson and M. Frasier. 2008. Water as a Crop: Limited Irrigation and Water Leasing in Colorado. Review of Agricultural Economics. Vol. 30 No. 3 pp. 435-444.

**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**

Feasibility and economics of anaerobic digesters for the dairy industry

**2. Associated Institution Types**

- 1862 Extension
- 1862 Research

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

Year	Quantitative Target	Actual
2008	{No Data Entered}	0

**3c. Qualitative Outcome or Impact Statement****Issue (Who cares and Why)**

It is a goal of this project to develop a set of simple tools for Colorado dairy producers to make preliminary assessments on the feasibility of installation of anaerobic digesters.

**What has been done**

A feasibility study was conducted for installation of an anaerobic digester at an organic dairy near Platteville, CO. Included in this feasibility study was a determination of biochemical methane potential for various waste streams generated on and nearby the dairy and an assessment of appropriate technologies. A report was provided to the dairy and to the Governors Energy Office detailing findings from the feasibility study. Based on lessons learned from this feasibility study, a protocol has been developed and documented for future feasibility studies on anaerobic digester installation at animal feeding operations.

## Results

While installation of an anaerobic digester at the dairy facility investigated was determined to be technically feasible, an economic analysis showed that installation would not be economically viable. Further, several technical barriers were identified. The most important being the quality of the waste produced at the facility. The waste has very low water content and large quantities of soil and rocks, raising several technical challenges. These manure qualities are common to dairy waste generated in Colorado, due to the arid climate observed here. While these barriers can be overcome, there is a requirement for a more complex system and external water to be supplied. A procedure for feasibility has been developed which will be refined and published as part of the decision making tools developed for this project. This will help producers and their advisers to go through the preliminary steps of a feasibility study, thus improving their ability to make informed decisions.

### 4. Associated Knowledge Areas

KA Code	Knowledge Area
132	Weather and Climate
403	Waste Disposal, Recycling, and Reuse

## Outcome #9

### 1. Outcome Measures

Water Management Tools

### 2. Associated Institution Types

- 1862 Extension
- 1862 Research

### 3a. Outcome Type:

Change in Action Outcome Measure

### 3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	{No Data Entered}	0

### 3c. Qualitative Outcome or Impact Statement

#### Issue (Who cares and Why)

Accurate estimates of water availability, demand, use, and augmentation requirements play an essential role in keeping Colorado agriculture competitive, in developing rural communities, and in promoting harmony between agriculture and the environment. CSU, being a credible impartial party in water issues, is able to develop methodologies and software, that build consensus on water issues and prevent costly legal battles.

#### What has been done

The SPMAP tools, including the Augmentation Accountant, IDSCU, Aquifer Water Accounting System (AWAS) have a proven track record with water managers dealing with the complex issues pertaining to water scarcity and high demand. We continue to very actively work with the water community to enhance the tools to meet the ever increasing set of complex problems facing agricultural water users.

#### Results

AWAS was adopted by the State Engineer as the program to use for estimating the impacts of depletions or accretions to the river. This means that most or all augmentation plans that are being processed by the state are using tools that we have developed as part of this process.

See, Elhaddad, A., Garcia, L. A. 2008. Surface Energy Balance-Based Model for Estimating Evapotranspiration Taking into Account Spatial Variability in Weather. ASCE Journal of Irrigation and Drainage 134 (6): 681-689 and Garcia, L. A. 2008. Refining Water Accounting Procedures Using the South Platte Mapping and Analysis Program. Presented at the Colorado Water Congress, Denver, Colorado, January 25.

#### 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

##### Brief Explanation

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

##### 1. Evaluation Studies Planned

- After Only (post program)
- Before-After (before and after program)
- During (during program)
- Case Study

##### Evaluation Results

Considering multiple programs delivered through this Core Competency Area (CCA),

- 64 percent of participants reported changing attitude and intending to change behavior as a result of this program.
- 69 percent of participants indicated a change in behavior/best practice adopted.

##### Key Items of Evaluation

Work Teams involved in this programming have spent considerable time collecting demographic information on their participants. Future efforts should concentrate on impact evaluation.

**Program #7****V(A). Planned Program (Summary)****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	8%		0%	
603	Market Economics	2%		0%	
604	Marketing and Distribution Practices	6%		0%	
605	Natural Resource and Environmental Economics	0%		30%	
607	Consumer Economics	3%		0%	
608	Community Resource Planning and Development	75%		20%	
610	Domestic Policy Analysis	6%		0%	
803	Sociological and Technological Change Affecting Individuals, Families and Communities	0%		10%	
<b>Total</b>		100%		100%	

**V(C). Planned Program (Inputs)****1. Actual amount of professional FTE/SYs expended this Program**

Year: 2008	Extension		Research	
	1862	1890	1862	1890
<b>Plan</b>	9.0	0.0	4.0	0.0
<b>Actual</b>	8.0	0.0	5.6	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
150568	0	194545	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
150568	0	194545	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
370331	0	748837	0

**V(D). Planned Program (Activity)****1. Brief description of the Activity**

•Internal training for CE personnel in community mobilization, facilitation, economic development. •Working 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, community organizations.

**V(E). Planned Program (Outputs)**

**1. Standard output measures**

**Target for the number of persons (contacts) reached through direct and indirect contact methods**

	<b>Direct Contacts Adults</b>	<b>Indirect Contacts Adults</b>	<b>Direct Contacts Youth</b>	<b>Indirect Contacts Youth</b>
<b>Year</b>	<b>Target</b>	<b>Target</b>	<b>Target</b>	<b>Target</b>
<b>Plan</b>	1500	3000	0	0
2008	34252	3048	0	0

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

**Patent Applications Submitted**

<b>Year</b>	<b>Target</b>
<b>Plan:</b>	0
2008 :	0

**Patents listed**

**3. Publications (Standard General Output Measure)**

**Number of Peer Reviewed Publications**

	<b>Extension</b>	<b>Research</b>	<b>Total</b>
<b>Plan</b>	0	0	
2008	6	31	37

**V(F). State Defined Outputs**

**Output Target**

**Output #1****Output Measure**

- The number of training opportunities for CE staff

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2008	2	5

**Output #2****Output Measure**

- Training opportunities for community members

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2008	5	99

**Output #3****Output Measure**

- Tourism rallies held

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2008	2	0

**Output #4****Output Measure**

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

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2008	10	6

**Output #5****Output Measure**

- Number of volunteers supporting this program

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2008	{No Data Entered}	139

**Output #6****Output Measure**

- Number of new technologies adopted by producers

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2008	{No Data Entered}	12

**Output #7****Output Measure**

- Number of newsletters developed in support of this plan

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2008	{No Data Entered}	5

**Output #8****Output Measure**

- Number of newsletters distributed in support of this plan

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2008	{No Data Entered}	10

**Output #9****Output Measure**

- Number of agencies partnering in this program effort

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2008	{No Data Entered}	53

**Output #10****Output Measure**

- Amount of grant dollars raised to support this program

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2008	{No Data Entered}	748837

**V(G). State Defined Outcomes****V. State Defined Outcomes Table of Content**

O No.	Outcome Name
1	Number of staff increasing knowledge of sustainable community development principles, facilitation, and economic development strategies.
2	Percent of community residents, businesses and leaders who increase their understanding of sustainable community development and tourism and economic development principles.
3	The number of communities which evaluate tourism potential and prioritize to target specific interests, increase action around tourism issues ,and identify valued community resources to maintain.
4	The number of communities which experience increased economic gain from tourism, including increased tax revenues, tourism-related employment, and retention of community valued resources.
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 changed behavior as a result of these programs
7	ROI in Community Rural Technical Assistance Program
8	As a result of research and extension/educational effort, a change in the market grading system will result in higher value of carcass not currently captured in grid marketing systems.
9	Graduate program in Integrated Resource Management

**Outcome #1****1. Outcome Measures**

Number of staff increasing knowledge of sustainable community development principles, facilitation, and economic development strategies.

*Not reporting on this Outcome for this Annual Report*

**Outcome #2****1. Outcome Measures**

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

**2. Associated Institution Types**

•1862 Extension

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

Year	Quantitative Target	Actual
2008	35	89

**3c. Qualitative Outcome or Impact Statement****Issue (Who cares and Why)**

The Department of Local Affairs (DOLA) Rural Technical Assistance Program builds connections with local governments and their communities by bringing students in who can help with concept designs for parks, open space, libraries, town halls, civil engineering projects and more. The students' design work costs less than professionals charge, and are often used by communities in grant applications to state agencies, which, if awarded, can be used for professional services.

**What has been done**

In addition to DOLA projects (above), training and technical assistance was delivered by work team members in many topics related to sustainable community development. Some that provide evaluation data included: Renewable Energy Solar and Wind; Sunflower Production; Opportunities to enhance economic development; proper fire hazard reduction practices; Working as a team; Effective group process and collaboration building scenarios; team teaching; and curriculum to interactively train Colorado State Patrol in improved communications skills.

**Results**

One project reports these results: CSU is garnering positive political capital, opportunities for research, access to new data bases, practical hands-on experience for undergraduates and graduates, and the Colorado State Patrol is receiving reliable, research-based programming that is updated as research is completed. The activity of this project has lead to several conversations amongst prominent government officials and department heads on campus. This partnership is not only providing for a productive alliance between two public agencies but also demonstrates how government can be more efficient in their use of funding.

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
605	Natural Resource and Environmental Economics
608	Community Resource Planning and Development
803	Sociological and Technological Change Affecting Individuals, Families and Communities

**Outcome #3**

**1. Outcome Measures**

The number of communities which evaluate tourism potential and prioritize to target specific interests, increase action around tourism issues ,and identify valued community resources to maintain.

**2. Associated Institution Types**

•1862 Extension

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

Year	Quantitative Target	Actual
2008	10	0

**3c. Qualitative Outcome or Impact Statement****Issue (Who cares and Why)**

The most frequently cited ideas that participants gained from the workshops were investing in collaboration and networking, adding a new product or service, and developing a marketing plan or conducting a market analysis for their proposed product or service.

**What has been done**

According to workshop participants who completed an evaluation form, their current involvement in agritourism (to assess learning skill needs):

- \* 41 percent of all workshop participants were already involved in agritourism;
- \* 19 percent were just learning about agritourism as an alternative enterprise; and
- \* 29 percent were in the planning stages of an agritourism enterprise (Cortez, Colorado had the greatest number at this stage).

**Results**

No formal evaluation has been done of all participants, but some anecdotal evidence from early follow-up suggests three general action changes.

- 1) Several community networks of agritourism enterprises have begun to coordinate activities. This has resulted in at least 3 regional projects meeting regularly and securing grant funds for their projects.
- 2) At least five agritourism enterprises have followed up with CSU personnel with partly developed business planning materials which they requested feedback on, and several have noted undertaking new marketing and business planning activities in 2008.
- 3) The Colorado Department of Agriculture has noted a significant increase in the number of enterprises registering for their agritourism and other marketing directories, suggesting increased marketing activity. Also, from April to December there were 1,430 hits on the main agritourism website, and 227 on the resources page.

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
605	Natural Resource and Environmental Economics
608	Community Resource Planning and Development

**Outcome #4****1. Outcome Measures**

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

**2. Associated Institution Types**

•1862 Extension

**3a. Outcome Type:**

Change in Condition Outcome Measure

**3b. Quantitative Outcome**

Year	Quantitative Target	Actual
2008	5	0

**3c. Qualitative Outcome or Impact Statement****Issue (Who cares and Why)**

Small, rural communities in Colorado continue to lose population and economic viability. A variety of local efforts are needed to strengthen local economies.

**What has been done**

Montezuma and La Plata counties have begun their own regional program to promote agritourism and farmers' markets by securing a USDA grant for \$50,000 in August 2008, and planning a follow-up workshop to address business development issues that producers have identified.

**Results**

The Colorado Department of Agriculture is considering new funding streams for agritourism enterprises to apply for seed funds, and the Colorado Tourism Office has reached out to heritage ag projects, leading to one successful project (Jackson County) and one partially-funded asset mapping exercise (Larimer and Weld Counties).

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
608	Community Resource Planning and Development
605	Natural Resource and Environmental Economics
602	Business Management, Finance, and Taxation
601	Economics of Agricultural Production and Farm Management

**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
2008	{No Data Entered}	65

**3c. Qualitative Outcome or Impact Statement****Issue (Who cares and Why)**

Sustainable community development requires new and different approaches and ideas. Extension has helped communities to identify a variety of strategies.

**What has been done**

Many topics were presented in support of sustainable community development. Among those providing evaluative data on changing attitudes were: Renewable Energy - Solar and Wind; Oil seed crops potential in the Southwest; Opportunities to enhance economic development; Identified risks and priorities related to fire hazard reduction to protect life and property while developing Community Wildfire Protection Plans; Feeling "ownership" in group functions; Active participation in decision-making; and Seeing ways to improve their community's assets.

### Results

The results of Extension's programming efforts will continue to be felt as communities undertake various strategies to strengthen their sustainability.

#### 4. Associated Knowledge Areas

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

### Outcome #6

#### 1. Outcome Measures

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

#### 2. Associated Institution Types

•1862 Extension

#### 3a. Outcome Type:

Change in Action Outcome Measure

#### 3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	{No Data Entered}	82

#### 3c. Qualitative Outcome or Impact Statement

##### Issue (Who cares and Why)

One aspect of sustainable community development programming involves a contract with Colorado's Department Of Local Affairs (DOLA). In response to their request, CSU/DOLA projects are now being evaluated according to how they improve the livability of the communities served.

##### What has been done

The term livability has been around for almost a decade and some studies suggest that smart growth and livability are top-down, local government-driven efforts to improve cities and the lives of people who live in them. Other studies have argued that the creation of livable cities requires a fully engaged citizenship to be effective in improving the quality of life. (Kent Portney, 2005). Our effort with the Community Rural Technical Assistance program is to include both of these areas under our project work. We contract our work to help local governments and promote local involvement of stakeholder groups or citizen workshops and public meetings to include the views and desires of the whole community.

### Results

#### Livability Results

This effort addresses the value of our program to Colorado's Department Of Local Affairs (DOLA) and to the communities we serve. It shows that the program is integral to the policies and programs of DOLA and local communities and that it furthers the education of our constituents as to the impact this program has.

#### 4. Associated Knowledge Areas

KA Code	Knowledge Area
---------	----------------

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

**Outcome #7****1. Outcome Measures**

ROI in Community Rural Technical Assistance Program

**2. Associated Institution Types**

•1862 Extension

**3a. Outcome Type:**

Change in Condition Outcome Measure

**3b. Quantitative Outcome**

Year	Quantitative Target	Actual
2008	{No Data Entered}	0

**3c. Qualitative Outcome or Impact Statement****Issue (Who cares and Why)**

From 2003-2007 the technical assistance (TA) Program was able to commit almost \$445,000 of program and community matching funds. This resulted in the construction of almost \$55 million worth of projects. For every \$1 in program and community matching funds spent, over \$122 was returned to the communities in the form of construction projects. This funding is in part returned back to the local economy to purchase goods and services from Main Street as well as from suppliers across the state.

**What has been done**

Over the five-year survey period the CSU-DOLA Technical Assistance Program expended approximately \$1.228 million dollars to employ the two community development coordinators, pay project expenses, transportation, and other office expenses. Additionally these funds were also directed to a range of non-construction directed efforts producing projects such as Labor, Housing and Market studies, on-site consultations, Main Street Resource Studies, and a range of community and regional economic surveys and analysis.

**Results**

Including total program administrative expenses and matching funds committed to community projects during the last five years over \$44.00 was returned to the community for each dollar invested in the Community Rural Technical Assistance program.

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
608	Community Resource Planning and Development
803	Sociological and Technological Change Affecting Individuals, Families and Communities

**Outcome #8****1. Outcome Measures**

As a result of research and extension/educational effort, a change in the market grading system will result in higher value of carcass not currently captured in grid marketing systems.

**2. Associated Institution Types**

•1862 Research

**3a. Outcome Type:**

Change in Condition Outcome Measure

**3b. Quantitative Outcome**

Year	Quantitative Target	Actual
2008	{No Data Entered}	0

**3c. Qualitative Outcome or Impact Statement****Issue (Who cares and Why)**

Large numbers of finished beef cattle now are marketed on grid-based pricing systems. Carcasses that do not conform to mainstream specifications generally do not achieve full value due to failure to achieve premium prices.

**What has been done**

Research was conducted to evaluate beef carcass ribeye area at the 12th and 13th rib interface (LMA) and its relationship to portion sizing acceptability of other muscles in the carcass. Sixty beef carcass sides of varying LMA sizes (between 67.74 and 166.13 cm<sup>2</sup>) were fabricated into 14 individual cuts. Retail portion size (g/1.27-cm steak), along with cut surface area and dimensions, were recorded from steaks cut perpendicular at the midpoint of the longitudinal axis of each muscle. Subsequently, a nationwide survey was conducted with foodservice chefs and retail meat merchandisers to evaluate acceptability of portion sizes and dimensions of individual muscle cuts.

**Results**

Results showed that LMA was not associated with retail portion size for 6 of the 14 muscles. Similarly, LMA did not affect surface area of the face of the steak from 6 of the 14 muscles. Muscles for which portion characteristics were related to carcass LMA were further evaluated in the survey. Many muscles were still acceptable to retail merchandisers and foodservice chefs in portion size, even though carcass LMA was outside the range of commercially acceptable sizes. This study demonstrate that carcass LMA is not an accurate determinant of the size, and subsequent acceptability, of other muscles in the carcasses and may not be a good determinant of the remaining value of the beef carcass; it will be used by industry to modify current beef pricing practices.

See Bass, P.D et al. 2008. Recovering value form beef carcasses classified as dark cutters by United States Department of Agriculture graders. J Anim Sci 86: 1658-1668. Also Garcia, L.G et al. 2008. National Beef Quality Audit 2005: Survey of targeted cattle and carcass characteristics related to quality, quantity, and value of fed steers and heifers. J Anim Sci 86:3533-3543.

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
604	Marketing and Distribution Practices
603	Market Economics

**Outcome #9****1. Outcome Measures**

Graduate program in Integrated Resource Management

**2. Associated Institution Types**

- 1862 Extension
- 1862 Research

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

Year	Quantitative Target	Actual
2008	{No Data Entered}	0

**3c. Qualitative Outcome or Impact Statement****Issue (Who cares and Why)**

Improving the competitive position and sustainability of independent livestock producers and sustaining the economic and environmental health of the rural communities that depend upon them requires the development of educational programs to reach students and appropriate clientele groups

**What has been done**

The Western Center for Integrated Resource Management graduate program will continue to be the primary emphasis with more attention to the outreach/distance education component. We offered two courses online during Fall 2008. Our enrollment in these two courses, which include our hallmark introductory course (AGRI 630) and our animal resource course (AGRI 633), have attracted eight and three students, respectively. This enrollment has been accomplished without marketing or promotion, merely by student inquiry, so we expect the program to grow as we work with Colorado State's Continuing Education unit to promote these courses.

**Results**

We have experienced significant interest in our online degree program. That program will eventually include all 11 of our courses. Two additional courses will be offered online this spring, and another two next fall. With a total of six of our courses online next fall, we will have achieved our goal of providing international access to our courses. A cooperative agreement is being negotiated through the College of Agriculture to offer our distance program through 12 other universities, allowing graduate students from those other institutions to access our courses and receive credit through their home institutions. This program is now tentatively named AG-IDEA, and details are available at <http://www.agidea.org/>.

See, Hewlett, J. and Parson, J. 2008. High Plains Ranch. A RightRisk Scenario Guide #SG-08-10; Hoag, D., Parsons, J. and Olinger, J. 2008. Oasis Ranch. A RightRisk Scenario Guide #SG-08-09; and Hewlett, J. and Parson, J. 2008. High Plains Ranch. A RightRisk Scenario Guide #SG-08-10.

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
601	Economics of Agricultural Production and Farm Management
604	Marketing and Distribution Practices

**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**

Relevant data may be excluded due to the complexity of multiple reporting mechanisms.

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

### **1. Evaluation Studies Planned**

- After Only (post program)
- Before-After (before and after program)
- During (during program)
- Case Study

### **Evaluation Results**

This Core Competency Area (CCA) often reports compelling stories, in addition to hard data. As the work teams redefine their structure, they may evaluate various objectives and be able to provide additional quantitative data and impacts.

### **Key Items of Evaluation**

Work Teams in this area have spent considerable effort collecting demographic information on their participants. In the future they must focus on impact evaluation.