

# 2009 Utah State University Combined Research and Extension Annual Report of Accomplishments and Results

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## I. Report Overview

### 1. Executive Summary

The Utah Agricultural Experiment Station (UAES) and Utah Cooperative Extension Service (UCES) work in nine major program areas: (1) Land Use and Sustainable Communities, (2) Sustainable Plant Communities, (3) Sustained Livestock Production, (4) Plant, Animal, and Microbial Genomics, (5) Nutrition, Production, and Safety of Food Products, (6) Water and Soil Conservation and Uses, (7) Natural Resource Systems and the Environment, (8) Production, Marketing, Trade, and Development Economics, and (9) Individuals, Families, and Communities. A 2009 report on each is briefly described below.

#### LAND USE AND SUSTAINABLE COMMUNITIES

Rural communities are at a cross-road with growth and development being tied to economic development. UAES and UCES foster economic and community development by partnering with other agencies to provide training, information and feedback. USU Extension has a Best Practices team to review and determine the most valuable resources for entrepreneurs. The team created a tool kit for developing businesses. Extension has worked with several of small businesses, linking them with resources for developing web pages and for investigating E-Commerce possibilities.

UAES and UCES help communities develop alternative land use planning futures. They developed three alternative futures for four rural communities along a 25 mile corridor leading to Zion Canyons that are impacted by millions of tourists per year. Their study report, which includes GIS mapping, is used by the Five County Association of Governments as the basis for a Corridor Management Plan for national scenic highway designation. The county, state and each of the four communities use the study to guide revisions to their zoning ordinances and general plans.

During 2008 and 2009 concept plans and phase one plans of a new Botanical/Demonstration Gardens in Cedar City were produced by USU Extension. The plans helped secure initial funding to start the project and will guide future development.

UAES working with Manti City, Utah Department of Transportation, Sanpete County Extension, and David Anderson, Director of the Utah Botanical Center developed a Master Plan and design guidelines for the Central Utah Pioneer Heritage Center. The illustrative Master Plan and guideline illustrations can be used in a number of ways for promotion, general communications, funding applications, and to guide a future consultant as final drawings are prepared.

UAES and Landscape Architecture Environmental Planning participated in Envision Utah's Vision Cache workshops. The charrette was held during the first week of February 2009. Nearly 50 posters and 15 PowerPoint presentations were completed in a five day period. Envision Utah utilized the posters and PowerPoint in their community scoping meetings for education and to illustrate ideas.

USU Extension works with local leaders to develop a diversified economic base that helps provide a sustainable community and develops a community awareness to let residents know what resources are available to them. The High Desert Growers Farmers' Market provides exciting opportunities to vendors and patrons. Extension secured a grant and organized local gardeners and growers to start the market. The variety of the produce being offered has also expanded to provide honey and potted herbs. The community shows great enthusiasm and support for the farmers' market. Twenty-three local growers, including 4-H projects, sold over \$10,000 of produce at the market. The farmers' market was an integral part of the gold level Health Community Award received by Price City in 2009. The Stock show sale had approximately 220 buyers and the gross sales of the show were over \$145,000.

Small Acreage Workshops continue to be held by USU to help small land owners learn how to get benefit from their small acreages.

#### SUSTAINABLE PLANT COMMUNITIES

USU is the local component of a continent-wide cooperative research project to understand rootstock-environment interactions. Results from a root sampling study in the 2001 Peach and 1998 Tart Cherry studies present a novel method for rapidly comparing root distribution among trees in an orchard. This is a powerful tool for studying rootstock - environment interactions and is changing the way researchers approach studies comparing candidate rootstocks. Results from the 2003 Golden Delicious NC-140 trial are the basis for recommending apple rootstocks that are regionally adapted. The 2007 peach rootstock trial has resulted in more information being requested on alkaline soil-tolerant rootstocks. The results of this cooperative project are directing the commercialization of new rootstocks and providing

guidelines that determine rootstock selection throughout the international fruit industry.

USU is involved in spring barley research. Outcomes of the research are primarily cultivars that are released and made available to producers. In addition, information allowing stakeholders to make decisions regarding cultivar selection for their own geographical areas is disseminated at field days, through Utah Agriculture Experiment Station research reports, and through refereed articles. The most recent release for spring barley, Goldeneye, is being used on significant acreage in Utah.

Abiotic stresses like drought and heat significantly reduce crop plant productivity. USU Extension and UAES are learning more about the mechanisms plants use in stress acclimation. USU has shown that accumulation of the phosphoinositide (membrane lipid), PtdIns (4, 5) P<sub>2</sub> is likely to be the cause of multiple mutant phenotypes in an *Arabidopsis thaliana* sac9 mutant. This work is helping us to understand not only the role of phosphoinositides in plants, but the negative impact of over accumulation of these membrane lipids.

USU assists residents with home horticulture and gardening through a number of different activities and programs including placing horticulture related news articles in county wide newspapers; yard and garden classes on pruning fruit trees, lawn care, drip irrigation, vegetable production, and hanging baskets. A drip irrigation fact sheet published in 2009 is being used in 50% of the counties in Utah and in 15 states. Master Gardener Training is available through Extension in Utah. Gardeners learned about how to raise transplants, appropriate seeding techniques, approaches to improve water savings, and deal with common vegetable production problems (temperature extremes, nutrient issues, weeds, insects, diseases). Detailed information on specific vegetables is discussed and issues of concern to each plant type are addressed. Gardeners are encouraged to share their local knowledge and participate in group learning. Plant Clinics, Garden Center Open Houses, County Fairs and Garden Tours provided Master Gardeners with an opportunity to return service hours. Advanced Master Gardener Weed and Other IPM Training Special labs were held for the Advanced Master Gardeners.

USU Extension presentations made to commercial fruit producers have resulted in several of the large-scale producers participating with the NRCS EQIP program. At least three growers have invested in capacitance equipment for measuring soil moisture and are integrating this equipment into orchard irrigation management practices. One orchard manager reported that by using this technology and his increased knowledge of orchard irrigation, he had delayed the first spring irrigation on one of his farms by 12 days. This resulted in a savings of 144 acre-feet of water and approximately \$2,400 in pumping costs on that one farm alone.

USU Extension meets with, teaches, and assists farmers, ranchers and private landowners about protected forage quality and yields, understanding grasshopper biology and control options, and understanding how to obtain 90% cost-share money from USDA and local government. In addition they assist farmers, ranchers and individuals who handle, supervise or apply restricted use pesticides learn how to properly apply the pesticides, read product labeling, understand warnings, and re-certify or obtain licenses from the Utah Department of Agriculture and Food.

USU offers a plant pest diagnostic clinic throughout the growing season where pictures are sent to either Thanksgiving Point or Utah State University in Logan to help diagnosis plant problems. From an informal survey from the participants USU found that by following the recommendations given to them during the clinic they were able to save over \$300 on their home landscape.

USU Extension has water-wise native plant demonstration gardens with interpretive signs for each garden that provide links on the signs to the USU Extension website for further information on native plants and water-wise landscaping, and to direct website visitors to the location of the gardens. These, in turn, link to USU Extension fact sheets and bulletins that have and will be written on these topics.

USU Extension holds workshops on Small Acreage management around the state. These workshops were based on data generated by UAES scientists. The development of the SmAc website helps small acreage owners via these resources and the entire effort increases the visibility of the local USU Extension Offices and the resources there to this new group of Extension users. Previous surveys conducted suggest that small acreage owners experience a \$25 per acre benefit from implementing Extension recommendations.

USU Extension conducts integrated orchard research including use of validated trap thresholds that enhances detection of codling moth in mating disrupted orchards, decreasing errors in application of supplemental insecticide controls (both over- and under-treatment), and increased use of mating disruption by Utah's apple producers. On-farm demonstrations using reduced-toxicity insecticides as alternatives to organophosphate (OP) insecticides for cherry fruit fly control has increased the use of low toxicity insecticides and helped cherry growers move away from reliance on OPs as they are phased out of registration by Environmental Protection Agency. USU showed there are clear differences among four commonly used mating disruption (MD) dispensers that release sufficient pheromone after 140 days of field aging. Based on these results, we advise growers to carefully monitor codling moth activity in all MD-treated orchards. These results help growers select the most effective MD dispenser for use in their orchards.

During the 2009 season, Utah had a major reduction of adult beetles due to the tremendous success of a spray program. Over 1900 traps were set out in a much smaller area than the 2008 program. The total number of beetles caught in the 2009 season was 6, which was approximately a 98% reduction of beetles trapped during the previous season. Master Gardener and other extension people continue to assist with this eradication program.

Utah State University Extension participates in jail gardens in prison facilities throughout Utah. One jail garden

produced over 49 tons of produce. This was from approximately 21 different vegetable and fruit varieties. There were over 6,800 man hours donated by the jail inmates. The Jail officers continue to use this program as a training site for the inmates as they prepare to leave the jail facility. The positive support from the community for this program is wonderful public relations for both the Salt Lake County Jail and Utah State University Extension. From 2007 through 2009, the Jail garden for the last three years has graduated 48 inmates with Utah Gardener Certificates. The total pounds of produce equal to 50,000 pounds, and total revenue generated for the county is over \$40,000.

Infestations of onion thrips is the most common cause for insecticide use in dry bulb onion production in the western U.S. As a result of UCES and UAES, Utah onion growers have switched their primary onion thrips pest management strategy from sole reliance on repetitious insecticide applications to crop management (especially nitrogen and irrigation management), biological control, and rotations of reduced-risk insecticides. These changes impact approx. 2,000 acres of dry bulb onion production in Utah for an annual savings of approx. \$180,000 and improved consistency in bulb quality and size. Reduced insecticide use contributes to environmental impacts by reducing non-target effects on beneficial insects, water and soil quality, and ecosystem health and reduces human exposure to pesticides from farm applicators to onion consumers. Two growers report that they now are growing their onions (260 acres; 20% of Utah Acreage) with reduced nitrogen applications while still maintaining good yields. This acreage is not being sprayed with insecticides and growers report that thrips numbers are low, and IYSV is not a problem. With these management changes, growers report production costs reduced by about \$1000/acre for a savings of \$260,000.

The total value of Utah minor crops is \$98 million. UAES and UCES develop data necessary for submitting minor crop pest control options to the EPA for approval. Through the years this program has expanded to include ornamentals and also, biopesticides including microbials like bacteria and viruses, and biochemicals like pheromones and growth regulators. This program works with farmers, agricultural scientists, commodity organizations, and extension personnel to provide pest management solutions to growers of minor crops. This program has helped in securing clearances for registration of certain pesticide uses on these Utah crops: alfalfa, apple, apricot, asparagus, bean (dry), broccoli, brussels sprouts, cabbage, cane berry, canola, cantaloupe, carrot, cauliflower, cherry (sweet), cherry (tart), clover, field corn, honey and beeswax, honeydew melons, lettuce, onion (dry), pasture grass, peach, pear, plum, potato, pumpkin, range grass, raspberry, safflower, snap bean, spinach, squash (winter/summer), sweet corn, tomato and watermelon. Potential economic losses of \$11,900,000 are estimated without this program. It is important to secure minor use registrations for agricultural producers for legal reasons and also to increase grower productivity and profitability. These additional registrations help maintain a high quality and varied supply of food, feed, and fiber and help to manage cases of pest resistance.

The Utah IPM Program and Utah Plant Pest Diagnostic Lab (UPPDL) work in concert to achieve common goals. Recently, the two groups created a visual identity, called "UTAH PESTS." The IPM program and UPPDL Web sites are both housed under the UTAH PESTS umbrella. The IPM Program assists the UPPDL through site visits and field diagnostics, field scouting and notification of unusual pest sightings, contribution to and facilitation of workshop programs including First Detector training, coordination/ preparation of the UTAH PESTS quarterly newsletter, and coordination/management of a county agent database of diagnoses from regionally-held plant clinics. Effective training has not only led to diagnosis of problems, but has resulted in recommendations that fit IPM goals and provide the most sustainable control options.

Thousands of applicators received education and training that helped them to become certified or recertified as licensed applicators with the UDAF thus staying in regulatory compliance. Hundreds of applicators wrote on evaluations that they would make positive changes in their use of pesticides. Environmental and human exposures to pesticides and their residues were reduced. Efforts improved environmental and public health.

Accurate and timely pest activity information and new management options provide green industry professionals, home gardeners, and tree fruit growers with the knowledge they need to treat pest problems with a minimal use of softer materials. The advisory program has had a positive impact on pesticide use in Utah, resulting in fewer unnecessary pesticide sprays, and conversion to softer materials. As people learn more about IPM, their perceived impediments to adopting IPM, such as a risk of damage and higher costs, are set aside, and what follows is confidence in implementing IPM techniques. In meeting the National IPM Roadmap goals, producing healthy plants without environmental degradation is a key priority. Advisory subscribers often send us feedback, and one of the most common comments is that their produce has never been healthier. Savings to growers and homeowners are due to reduced sprays, better spray timing, and knowledge of appropriate products.

Sustainability in landscapes, including decrease in water use, is becoming a critical necessity as climate change and population growth threaten to substantially limit water availability. Decreasing amenity landscape water use makes water more available for drinking and agricultural purposes. UAES researchers, in cooperation with cross-agency and multistate collaborators, are helping growers meet local and regional demands for native plant species by evaluating their water efficiency and adaptability to landscape use, and identifying efficient methods for their production. USU's work is suggestive that pot-in-pot production methods can be used cost effectively to shorten the time to sale by at least 50% for several slow-growing, high-value native plant species.

Utah, like much of the Intermountain West, is an urban state and turf grass is the largest component of most urban landscapes. USU is working to develop grasses and mixtures of grasses for these landscapes that can remain green and offer a safe surface for recreation while saving up to 50% of the water currently needed for turf grass areas. Data from

UAES evaluation trials in cooperation with the National Turf grass Evaluation Program are widely used by growers and seed companies around the country for adaptation to the cool-arid West. Identification of new turf grass species for Utah will also diversify the urban landscapes and offer new high value products to seed and sod producers.

Growers are adopting high tunnels technologies since this allows crop production outside the normal periods. More than 100 growers/market gardeners/intensive gardeners participated in workshops, training meetings or USU visits during 2009. Many of the workshop participants constructed tunnels on their farms. Growers' want more information on crops that benefit from high tunnel environments, want enterprise budgets for alternative crops, and want better techniques to manage temperature fluctuations during different times in the production cycles. Tomato growers reported 4-6 week earlier production; 10-20% increased in profits, rapid pay-off of infrastructure costs, better fruit quality, and more repeat business at farm stands or other market outlets due to early and late season production of crops grown in high tunnels. Strawberry growers report 4-6 week early production and strong market demand with prices ranging from \$3-4/lb.

Asparagus acreage in Utah now exceeds 30 acres. Consumer demand is strong and prices range from \$2-2.50/lb. Growers report excellent yields in 2009 with many getting more than 3500 lb/A. About 20 acres are being harvested all season with returns of \$6000/acre (prior to expenses). UAES continues to offer information on organics at different workshops. UAES research continues to show that tomato and lettuce yields in organic systems are higher than those in non-organic systems. Tunnels allow the production of produce (tomato) on-farm to more than 44 weeks using this system. Tomato growers in Davis Co grow from March to November; get prices ranging from \$2-3.50/lb at farmers markets and yields of 2-3 lbs/square foot. This works out to \$4-10 per square foot. Several growers are now growing tunnel house strawberries with very good success and getting returns \$3.50-4.50/lb for the berries in the early season.

UAES is involved in a project to develop a single cell phototrophic bacterium that can turn carbon dioxide and light into compounds that would be direct substitutes for gasoline and diesel fuel. USU discovered a photosynthetic bacterium that makes high quantities of heptadecene (C17) diesel substitute. The near term aim of this project is to characterize the diesel compounds made by these bacteria and to begin to understand the enzymes that create this compound. This research is expected to impact our knowledge of renewable liquid transportation fuel production using sunlight and CO<sub>2</sub> and phototrophic microbes. Little is known about using cyanobacteria to make liquid fuels, and USU has discovered one strain that makes C17 in considerable quantities. USU will determine conditions that result in the production of this fuel. If fully realized, this project could provide a novel way to make biofuels using phototrophic microbes.

## SUSTAINED LIVESTOCK PRODUCTION

UCES and UAES are involved in a wide array of studies and programs related to animal management systems. Producers report that researchbased information provided by USU Extension helps them plan their livestock marketing strategies as well as their cropping strategies. Information and training in QuickBooks, balanced rations, control of noxious weeds, and cost/benefit analysis have helped farmers to cut costs and improve production. As a result of these activities farmers attending USU Extension programs are spending more time looking at their operations and finding ways to cut costs and improve production.

Master Beef Manager Classes were held by USU Extension. Topics taught were livestock handling and facilities, bio-security, and financial and production record keeping. Beef producers learned relevant topics for sustained and profitable production. Pre- and post-workshop evaluations showed producer understanding increased ( $P < 0.05$ ) for more than 90 percent of the topics evaluated. In those topic areas where statistically significant increases were not exhibited understanding trends were positive, and were commonly in areas where traditional management techniques were taught in previous workshops and reinforced through this program. A survey of participants at the Range and Pasture Management Workshop showed that 100% of respondents rated the information received as good or excellent. Eighty percent of respondents felt that USU Extension's range and pasture information was extremely valuable.

USU Extension field days, producer meetings and workshops conducted throughout the state are a means to provide current and timely information to bee producers in the state. We are impacting how producers conduct their business and this is having far reaching benefits for the state.

Beef Quality Assurance (BQA) continues to be one of our major beef themes in the state of Utah. The NCBA beef audits have determined that if beef producers utilized specific management practices as outlined by the BQA program they could capture up to \$125 more per animal. In Utah this could provide millions of dollars into local economies.

UCES and UAES are involved in veterinary programs; poultry diseases; animal disease case investigations; disease pathogenesis in farmed fish species; emerging and exotic infectious disease; bovine mastitis and mastitis resistance to enhance dairy food safety; and epidemiology. UAES contributes a greater understanding of the mechanisms of action and economic benefits from the use of J5 vaccine against coliform bovine mastitis. Larger and higher producing dairy farms continue to adopt the use of J5 vaccine. The results suggest that even if a dairy farm with mycoplasma mastitis in the herd has mycoplasma-positive bedding or mycoplasma-positive recycled bedding, it can be used under cows without transmitting the disease to uninfected cows. The savings from not purchasing all new bedding materials such as sand from a sand quarry can readily be \$1 - 4 million per year per farm

In 2009, 7,611 cases were accessed at the Utah Veterinary Diagnostic Lab, which required 158,637 individual assays. In addition to the written reports, most cases required at least one, and often more, phone contacts. In addition to the

written reports, most cases required at least one, and often more, phone contacts. This means that USU personnel had direct one on one contact (often repeated) with almost 8,000 Utah citizens.

## PLANT, ANIMAL, AND MICROBIAL GENOMICS

Gene duplication is a primary source of new genes that have arisen through evolution. UAES is investigating how new gene functions arise after gene duplications. Work has continued on the analysis of expression of yeast genes that resulted from the whole genome duplication. USU is nearly finished with an important computational analysis that is investigating how often known gene regulatory elements are conserved in closely related yeast species. This work utilized the *Saccharomyces cerevisiae* Promoter Database (SCPD), a resource that lists known regulatory elements for approximately 200 yeast genes and a new database that UAES created, which summarizes all experimentally identified gene regulatory elements for approximately 40 yeast genes in much detail. When published, this smaller dataset will be a valuable resource to researchers who study gene regulation since it is a collection of gene expression information for 40 of the most experimentally characterized yeast genes.

Gastrointestinal nematode parasitism is arguably the most serious constraint affecting ruminant production worldwide. Economic losses due to parasite infestation in livestock species are estimated at more than \$3 billion per year, of which 60% of the losses occur in sheep. Genetic markers associated with parasite resistance/susceptibility will improve an animal's resistance to gastrointestinal nematode infection, reduce the need for anthelmintics, and improve overall production efficiency. This project will provide information on genetic regions controlling parasite resistance in sheep. Results could lead to genetic markers for selection of resistant sheep or treatment of parasite burdens in ruminants.

Many researchers, including UAES researchers, are establishing projects to identify economic trait loci (ETL) in livestock, including sheep. The International Sheep Genomics Consortium (ISGC), which includes members of the NRSP-8 Sheep Committee, has had noteworthy success in collaboratively developing and distributing resources that advance research in sheep genomics. Substantial leveraging of funds and expertise from the International Sheep Genomics Consortium, combined with technological and computational advances in the area of de novo sequence assembly, contributes significantly to the development of genomics resources that are used by scientists around the world. It is not just the agricultural research community that has benefited from these research tools. The sheep is widely used in biomedical research as a model organism for heart, lung and musculoskeletal diseases. Thus, biomedical researchers are keenly interested in these resources as well.

Radiation hybrid mapping is a method for producing high resolution genome maps, which can then be used for determining gene order. In this way, knowledge of the genome organization of a species is integrated with other species maps. The comparative map of the ovine genome that will result from this project can be orientated with respect to the genome maps of humans, mice and cattle, thereby facilitating identification of genes controlling important traits in sheep. The comparative map of the sheep genome that will result from this project can be orientated to the genome maps of humans, mice and cattle, thereby facilitating identification of genes controlling important traits in sheep.

An essential component of genomics research is the development of high-resolution, genome-wide physical maps. A physical map of a genome is created by systematically organizing cloned fragments from a large insert library into overlapping segments or contigs. The resulting "map" of DNA fragments becomes a guide for identifying the location of any gene or marker in the genome. This integrated high-resolution RH map provides a comprehensive framework for identifying positional candidate genes in sheep and will aid in the assembly of an ovine whole genome reference sequence, as well as other mammalian species.

Economic success for the US dairy industry is largely dependent on manufacture of natural cheese. Flavorful cheese has premium value, and *Lactobacillus helveticus* (LH) is widely used to intensify cheese flavor notes. This project will utilize the LH genomic sequence to establish the role of specific enzymes and metabolic pathways in cheese flavor development. Results will allow industry to more predictably enhance flavor of Cheddar, Italian, and Swiss cheeses. Transformation of bland curd into delicious mature cheese is a complex and dynamic process whose intricacies are scripted by the milk composition, the cultures and enzymes present, and the manufacturing and ripening conditions. Since flavorful cheese has premium value as a food or food ingredient, there is great industrial interest in technologies to accelerate ripening. Research has shown that lactic acid bacteria (LAB) present in cheese have a central role in flavor development, so effective strategies to accelerate or intensify cheese flavor can be derived from a more fundamental understanding of LAB physiology in milk and cheese environments. *Lactobacillus helveticus* CNRZ32 is a strain that is widely used by industry to intensify and modulate cheese flavor development. Because *L. helveticus* does not grow in Cheddar cheese, we are also performing parallel experiments with *Lactobacillus casei*, a bacterium that grows to high numbers in ripening cheese and has also been shown to impact flavor development. This research will boost development of desirable flavors during cheese aging, thereby enhancing competitiveness of US-made cheeses in the multi-million dollar global cheese market.

## PRODUCTION AND SAFETY OF FOOD PRODUCTS

New and improved foods have a tremendous ability to positively affect human health. Projects at UAES focus on improving nutrition and adding bioactive properties to foods. Projects include minimizing trans-fatty acids, utilizing whey

proteins, and examining the nutrition of milk fat in food systems. Polyunsaturated fatty acids and milk fat blends were examined to replace trans-fatty acids in foods. The effect of processing conditions and the stability of fats have been partially characterized. Another project seeks to provide a better understanding of how bifidobacteria respond to stress conditions commonly encountered in food systems, and identify potential strategies to enhance longterm cell survival. Findings reinforce our fundamental understanding of the genetics and physiology of these bacteria in foods. Wheybased fiber was examined as a replacement for cornstarch in snack foods. Data indicates the possibility to incorporate dietary fiber at levels of approximately 20%. Lastly, milk fat globules were examined for better characterization. Initial results indicate there are at least two different classes of milk fat in relation to triglyceride content. Further research is being conducted to determine any nutritional benefits. Through research in this area, consumers will be provided with an improved selection of high quality, low cost, safe, and nutritious foods. Food production and processing to meet the needs of today's consumers will enhance health and well-being and improve the nation's economy. Understanding the structural and functional relationships among various components of foods will allow better control and enhancement of food quality during processing, storage distribution, and preparation for consumption.

The Centers for Disease Control and Prevention (CDC) estimates that in the United States 76 million foodborne illnesses occur every year. This may cost as high as 40 billion dollars annually due to lost productivity and direct health expenses. While most people believe that manufacturers are the main source of foodborne illness the truth is that greater than 70% are caused in food service and in the home. Furthermore, Utah is disproportionately high, compared to the rest of the country, in consumers that participate in home food preservation and storage. UAES researchers and UCES staff have major programs aimed at home food safety and retailfoodservice food safety. Both programs are addressed at the state level and at the county level. The home food safety program includes home food preservation, storage, and food preparation. Each County provides direct educational programming based on researchbased results, such as seminars, to consumers to increase food safety knowledge and change behavior. Educational programs include safe hand washing, safe home canning, safe food storage, and safe food preparation (cook, clean, chill, and separate). In addition, state and local personnel answer several thousand direct consumer inquiries annually via telephone and email.

For retail and foodservice food safety, USU provides a Food Safety Manager's Certification Course. Exams are bilingual to assist Spanishspeaking foodservice managers. Each county in Utah supports the course and provides access to materials and testing. Safe food behaviors at the consumer and retailfoodservice level will reduce foodborne illness cases annually. Safe and proper canning will save a few lives of persons that otherwise may have contracted botulism. Educated and knowledgeable food service managers play a vital role in the safe food production at this level of the farm-to-fork food chain. The CDC has determined that foodservice operators who have passed a Food Safety Manager's Certification are less likely to engage in foodborne illness risk behaviors.

UAES scientists have developed new meat and dairy products that reduce the likelihood of foodborne contaminants and ensure relevant new foods enriched in vitamins and minerals, while adding less fat. Research efforts are also underway to identify means of various metabolic processes so as to enhance human health.

## WATER AND SOIL CONSERVATION AND USES

Satellite derived remotely sensed data (Landsat and ASTER) and digital elevation models were shown to be useful for mapping soils in mapping 200,000 acres of rangeland in Beaver County, Utah, and 20,000 acres of rangeland in southern Nevada in a UAES research effort. This has the potential to significantly reduce vegetation identification costs for large and small areas. This mapping procedure has also allowed large areas of at least 3 national forests to be screened for weeds and other vegetation types.

Education and research results on landscape irrigation and particularly turf grass irrigation are being conveyed directly to federal and state agencies as well as water purveyors. Since 2004, these findings have helped to generate a 13% decrease in statewide water use.

A UAES UCES project examines the value and safety of using compost as a soil amendment for crops and conditions present in Utah demonstrate that disposal of animal wastes on agricultural land is likely to continue as the primary beneficial mode of using the resource. Current estimates of organic/transitional producers in Utah are 150 operations. Current market value of compost in Northern Utah is approximately \$25 per ton for bulk agricultural use to \$65 per ton for wholesale bagged product for the retail market. Annual production of compost on Utah livestock operations ranges from 100 tons to 10,000 tons.

The affirmation of 30-year old average estimates of crop water use in the Snowville area is significant in that state agencies are using Et values from UAES research in water resources planning and water rights management throughout Utah. Work in estimating Et in other parts of Utah will further refine data for state and local water planning efforts.

As Utah's water needs continue to grow, the Slow the Flow program continues to be a great asset to Utah residents. With a grant for over \$89,000.00 from the Central Utah Water Conservancy District, data is compiled from each resident and a summary is made over the past year and the future 3 to 5 years. This documents how much water is conserved by individuals who participate in the Slow the Flow program. So far participating residents save 25-28 percent of their water use on their outside landscapes.

Various nurseries have incorporated the pot-in-pot production approach into their respective operations due to

ongoing UAES research and UCES efforts. If low maintenance turf grasses can be grown economically and successfully transplanted, the grass mixtures we identified will be used in a variety of urban landscapes, providing diversity as well as lower inputs of water and labor.

Many farmers in western Emery County have converted from furrow to sprinkler irrigation in the past five years through participation in the Colorado River Salinity Program. Over two hundred farmers have been trained in the past five years in this ongoing program. All farmers who have been trained have been able to certify, through their records, that they are operating their sprinkler systems properly. Participating farmers report water savings of 40 to 50%, and yield increases of up to 30% when converting from furrow to sprinkler irrigation.

The Utah Master Naturalist Program, on average, nearly doubled the knowledge of the participants and they strongly agreed that the UMNP has inspired them to learn and explore more of Utah's natural world.

Best management practices to reduce nutrient inputs to water bodies cost between \$500,000 and \$1,000,000 each year. Research based riparian loading models and UCES training on more effective monitoring will result in more targeted and effective use of these funds with measurable improvements in water quality. Citizen monitoring of 24 Utah lakes will allow the state to protect these lakes from over fertilization.

Beaver County water quality educational programs have made a difference in Beaver County. Sixty percent of the farmers in the Beaver River Watershed have participated in one or more of our cost share or educational programs. These programs have reduced the amount of manure and sediment entering the Beaver River and Minersville Reservoir. Many of the farmers have improved their irrigation systems by installing pivots. Other farmers have improved the pastures and rangeland by controlling sagebrush and noxious weeds and planting improved varieties of grass.

## NATURAL RESOURCE SYSTEMS AND THE ENVIRONMENT

Invasive weeds are one of the greatest threats to range resources in the West. Recommendations from the latest Utah-Montana-Wyoming Weed Management Handbook provide hundreds of Utah land managers with guidance for designing effective control programs against specific invasive weed problems. One of the largest existing and expanding invasive weed is cheatgrass. UAES research indicates that targeted cattle grazing at the appropriate phenological stage in spring can reduce cheatgrass biomass, reduce the density of viable cheatgrass seeds in the seed bank, and reduce the dominance of cheatgrass in the aboveground plant community. Thus, cattle, like goats and sheep, have the potential to be used as a biological tool to help break the cheatgrass-fire cycle affecting many degraded (former) sagebrush communities, and help set the stage for re-vegetation treatments to re-establish more diverse and desirable plant communities.

Assistance to family forests helps protect up to 20 percent of Utah's forest land. Urban forestry programs, which are a product of both UAES research and USU Extension efforts, include educating cities on tree plantings that reduce fire hazards and improve value of homes. USU Extension's utility pruning outreach efforts help reduce costs associated with power outages (estimated to cost the U.S. economy \$119 billion annually).

To enhance wildlife management recreational opportunities and alternate incomes from private lands, USU Extension program facilitated the establishment of the Cooperative Wildlife Management Program Unit (CWMU) and a business association of over 200 farm and ranch operations encompassing over 2 million acres of private rangeland in Utah. Annually, the Cooperative Wildlife Management Unit program generates over \$20 million in new revenue for Utah landowners and provides free access to over 4,000 Utah hunters annually to high quality big game hunting opportunities.

To protect and keep Sage Grouse habitat in Utah, UCES and UAES have organized local work groups which have taken the lead in protecting sage grouse habitat. USU continues implementation of 10 local working group sage-grouse conservation plans. Plan implementation efforts have engaged over 2000 stakeholders in over 50 field tours, quarterly meetings, and workshops. These efforts have resulted in the implementation and evaluation of management projects in 13 counties, encompassing over 50,000 acres. As a result, stable and increasing Sage Grouse populations are now being seen in multiple counties across the state.

Family Nights at Utah Botanical Center (UBC) introduces members of the local community, to the values of natural resources, wetlands and horticulture. The UBC Family Night Programs hosted over 950 members of the local community in 2009. On average, 40% of the attendees were visiting the UBC for the first time. During these visits, they have had the opportunity to learn about the conservation of natural resources (primarily energy and water), wetland ecology, and horticulture. As an added benefit, these visitors have had these experiences as a family, which, ideally, contributes to a change in attitude towards and an adoption of conservation practices as a family group, rather than simply as individuals.

UCES water quality program provided over 7,500 kids with water quality educational activities (at least an hour in length) through classroom visits, field days and camps and increased the skills of 105 educators, who each will relay these messages to hundreds of children each year. Follow up surveys with educators indicate that about 40% continue to use these methods in their classrooms, reaching thousands of additional students each year. UAES research and UCES activities have also contributed to a cleaner Bear River drainage system which runs through Rich, Cache, and Box Elder Counties.

Additional social benefits have been derived from the centralization of historical and current weather and climate data. Such data enable better weather forecasting models and are also extremely helpful in identifying longrun climate data in response to concerns about global warming and its potential impacts on the Intermountain West.

UCES and UAES have saved Utah cities money by helping them plan good and beneficial tree plantings. This in

turn saves the city tax payers money and improves the quality of live for the citizens. Cost savings by cities are estimated at \$5,000 to \$10,000 per city. This savings comes in proper tree selection and proper pest diagnosis and treatment.

## PRODUCTION, MARKET, TRADE, AND INTERNATIONAL ECONOMICS

Farmers and ranchers face and must manage each of the primary sources of risk (production, price/marketing, human, institutional/legal and financial). UCES provides educational programs based on UAES and other researchbased data designed to assist farmers and ranchers in evaluating and managing these risks. Participants in the Master Beef programs consistently indicated that their understanding of risk and risk management principles had statistically increased as a result of attending the workshops that were presented. Essentially every person that attended a record keeping workshop implemented the use of the materials that were presented (e.g., over 50 copies of QuickBooks are being used by program participants). Many of those that attended the fire and drought workshops made significant changes in their operations as a result of the material that was presented or distributed.

Entrepreneurship is a great way to increase the vitality of communities growing our own businesses has a larger multiplier and gives counties more employment and will allow them to create a more diverse economy rather than relying on one or two firms to supply the jobs. However, there are business management skills that are needed for people to assess ideas and create successful businesses. To teach these skills UCES held the 6th Annual Diversified Agriculture Conference, Women Entrepreneurs Workshop, presented at the Utah Green Industry Conference, and the Utah Pesticide Applicators and Lawn Care Maintenance. UCES also organized sessions for the Utah Green Industry Conference and helped them start a new business track to focus on management considerations and gathered and disseminated materials compiled by others on water rights and taxation Producers attending the Diversified Agriculture Conference indicated that the materials were of value and they were going to use them in their operations to make changes. The women Entrepreneurs workshop also had good evaluations and will be continued. The Utah Green Industry Conference is now going to include a track that will focus on business management. These various conferences were based on materials generated by UAES researchers.

UCES has been involved in studies and activities on enhancing the competitiveness of U.S. Red Meats; the emergence of supply chains and their potential impact on Utah's food and agriculture; cattle marketing and ranch management; crop marketing; and wholesaling and retailing non-traditional agriculture products in Utah. Through these studies cattle producers in Utah and surrounding states are kept abreast of changing market conditions. This year the impact of ethanol on feed prices and the resulting implications for the livestock industries was a major educational focus. Before and after tests at the Beehive Master Beef Manager Program showed that producers' knowledge was increased. Some producers make management and marketing decisions based on information from the USU Extension website, which in turn, is based on researchbased data analysis activities. Bankers and farmers have gained a better understanding of the current market forces impacting prices and returns to various crops.

In a 2005 program planning survey, expanded markets and profitability for agricultural products was rated high by 96% of respondents. The Farmers' Market at the Utah Botanical Center continued to grow as the second year of the market was completed. Over 5,476 people attended the farmers' market at the Utah Botanical Center.

Extensive research conducted under the auspices of the UAES has been undertaken on both domestic and international trade. Domestic trade research has been primarily directed toward the price discovery process and the role of niche markets. International trade research has focused on Utah's trade internationally, as well as the trade impacts of



NAFTA. NAFTA has yielded a positive net benefit to U.S. Agriculture in general, though some specific segments have been harmed. Additional research has been undertaken in the area of valuing nonmarket resources. Effective methods of nonmarket evaluation depend significantly on the type of good being valued, the study design, and the models used (i.e., contingent valuation attribute estimation, etc.).

**INDIVIDUALS, FAMILIES, AND COMMUNITIES**

Utah has 238,000 low income residents. Low income individuals are at high risk for food insecurity. The Food Stamp Nutrition Education Program and the Expanded Food and Nutrition Education Program are federally funded programs designed to educate low income families and individual on food budgeting skills, nutrition knowledge and food preparation skills. Participants showed positive behavioral changes in all 17 measures.

Financial resource management and bankruptcy prevention education is seen as priority programming by local advisory councils and county residents. Financial resource management concepts were provided to residents through office visits, phone calls, workshops, classes, special events, publications, news columns and newsletter articles. Finance workshops, courses and special events conducted, included Take Charge of Your Money Financial Fitness course, Earned Income Tax Credit education, Earn It Keep It Save It program, Utah Saves Campaign, Volunteer Income Tax Assistance (VITA) program, Individual Development Account (IDA) classes, Youth Finance Camps, and a Financial Wellbeing/Health Fair. USU Extension offers many of the educational workshops and classes within the Utah Saves campaign. These courses and activities are based on work done in the UAES, as well as other researchbased sources.

Utah Individual Development Account Network (UIDAN), a national program was originally brought to Utah by Utah Issues and is currently housed with AAA Fair Credit Foundation. UCES fostered a partnership with Utah Issues, AAA Fair Credit, and others to have UCES as the financial educators of this program. An eight to ten hour basic financial course is a requirement for UIDAN applicants. This financial course is taught to low-income, working adults who qualify into this national program to build wealth. The individual saves money towards a home, a secondary education or a small business and their money is matched 3 to 1.

Stepfamilies are becoming an increasingly common family formation in Utah. There are, however, few educational programs that help couples prepare for remarriage and/or enhance their relationships in the context of stepfamilyliving. UAES research is underway in an effort to determine if urban stepfamily relationships are significantly different from rural stepfamily situations. The outcome and impacts have been extremely positive. The adults who attended thestepfamily and remarriage education classes demonstrated statistically significant increases in knowledge and skills related to healthy relationships. Participants also experienced statistically significant increases in relationship stability and satisfaction. Overall, participants reported that remarriage and stepfamily education classes were very helpful. In the qualitative interviews, participants reported various benefits for their couple relationship, family relationships, and with their children.

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

Year: 2009	Extension		Research	
	1862	1890	1862	1890
Plan	158.0	0.0	63.2	0.0
Actual	176.0	0.0	60.2	0.0

**II. Merit Review Process**

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

- External University Panel
- Combined External and Internal University Panel
- Combined External and Internal University External Non-University Panel
- Expert Peer Review

## 2. Brief Explanation

USU anticipates on-going reviews of merit with the University of Wyoming, University of Arizona, and the University of New Mexico extension services. These institutions it is anticipated will review the program components suggested in each program area utilizing extension faculty qualified as specialists with significant program experience in the area being reviewed. In turn, Utah State University Cooperative Extension Service will review the work from these three institutions.

Scientific Peer Review Process - Agricultural Experiment Station: The scientific peer-review process within the agricultural experiment station has involved two steps. The first step included a review by two scientists requested by the principal investigator (PI). These two scientists provided written comments regarding the proposal which were then returned to the PI for evaluation and response. Prior to submission to the experiment station, the PI's department head also reviewed and signed off on the proposal. Once the proposal reached the station, two additional scientific peer reviews were obtained from subject matter experts, either from other on-campus faculty (if the expertise exists) or off-campus faculty (if on-campus expertise does not exist). These external reviews were returned to the experiment station and the PI's were subsequently asked to respond to issues raised by these reviewers. The PI then modified her/his proposal to address the issues raised by the "outside" reviewers before resubmitting it to the experiment station for funding consideration. The practice of sending reviews off-campus to qualified subject matter experts was used approximately 15% of the time.

## 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
- Survey of traditional stakeholder individuals
- Survey of the general public

#### Brief explanation.

The media sources are frequently used by Utah counties to encourage county residents to participate in public meetings and listening sessions. Ninety percent of reporting Utah counties reported using this methodology. Use of the local newspaper and radio through public service announcements and paid advertisements are the two primary techniques applied in media use. Targeted invitations to groups are more the norm with 16 out of 20 counties responding that they targeted traditional stakeholders through letter/poster invitations to participate in public meetings and listening sessions. Such announcements are often placed in public places, on bulletin boards, and other locales frequented by non-traditional audiences. Non-traditional stakeholder groups were also invited to participate in public meetings and listening sessions although to a lesser extent with 70% of counties indicating that they utilized this methodology. Inviting individual stakeholder and non-traditional stakeholder individuals to participate in public meetings and listening sessions is also a significant means for engaging them in discussions with 90% and 80% respectively of reporting counties utilizing this process. Surveys serve as another means for contacting stakeholders. Forty percent of counties reported utilizing surveys to traditional stakeholder individuals. Ten percent utilized surveys to the general public. Utah Extension and Utah Agricultural Experiment Station apply the practice of all reasonable effort by engaging stakeholders in face-to-face invitations to encourage participation in meetings where input for program planning is desired.

### 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
- Open Listening Sessions
- Use Surveys

**Brief explanation.**

The Utah Agricultural Experiment Station uses an advisory group that meets as needed to provide much needed input from the public and private sectors. Utah Extension utilizes advisory committees as the primary means of identifying stakeholder individuals and groups to collect program input. Principle council and advisory groups utilized included such groups as teen councils, horse and livestock councils, Workforce Services, Interagency Coalitions, community religious leaders, United Way, Utah Saves Advisory Boards, Utah Fair Boards, Utah Farm Bureau and Farmers Union, afterschool coalitions and previous recipients of Extension programs have been utilized. Over 95% of reporting counties (20) utilized this contact methodology. Half of reporting counties (20) indicated that they used focus groups and open listening sessions as means to identify groups and individual stakeholders. Half of reporting counties (20) indicated that the use of needs assessments and surveys provided another primary means of identifying individuals and groups through whom input was collected.

**2(B). A brief statement of the process that was used by the recipient institution to identify individuals and groups who are stakeholders and to collect input from them****1. Methods for collecting Stakeholder Input**

- Meeting with traditional Stakeholder groups
- Survey of traditional Stakeholder groups
- Meeting with traditional Stakeholder individuals
- Survey of traditional Stakeholder individuals
- Meeting with the general public (open meeting advertised to all)
- Survey of the general public
- Meeting specifically with non-traditional individuals
- Survey specifically with non-traditional individuals
- Meeting with invited selected individuals from the general public
- Survey of selected individuals from the general public

**Brief explanation.**

Utah Extension and Utah Experiment Station find that meeting with traditional stakeholders, often times in expansion and review settings and in advisory councils, are effective method for identifying program and administrative issues important to county residents. All reporting counties (20) utilized the method of meeting with traditional stakeholders and also meeting with them individually was an effective method for getting input. Some counties continued to report face-to-face interviews with stakeholders with Limited English Proficiency (LEP) using native speakers to conduct a "wants and needs" analysis. Forty percent of all reporting counties (20) indicated that they surveyed traditional stakeholder groups and individuals. Forty-five percent indicated that they met specifically with non-traditional groups and individuals and held meetings with invited selected individuals from the general public. Thirty-five percent of the counties reported utilizing open meetings advertised to the public as a means of obtaining input. Forty percent said that they met with selected invited individuals from the general public to receive programmatic input. The College of Natural Resources conducted in 2009 a Statewide Natural Resource Outreach Campaign to educate stakeholders on CNR's efforts that assist the state. They met with stakeholders in Vernal, Moab, Cedar City, Salt Lake City, and Brigham City to solicit input on the needs and interests of the stakeholders. The results have been used to tailor natural resource programming in Natural Resource Extension.

**3. A statement of how the input will be 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.**

The input received from stakeholders was utilized most to redirect Experiment Station and Extension programs (90%) to gather information on emerging issues (85%) and to set priorities as a unified Extension and Experiment Station organization (85%). With an ever growing metro population along the Wasatch Front in Utah this input has been valuable in redirecting program emphasis areas to reflect the needs of metropolitan populations. To a lesser extent input was applied to Extension programs in redirecting research programs (45%) in the hiring of staff (30%) and in the action plans of the county (50%). These inputs frequently inform Extension through influencing recruitment and hiring practices and inform Extension on the types of research that stakeholders perceive as critical to their need. The Experiment station uses stakeholder input provided by Extension and advisory group input to make changes in the research program.

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

We are mostly on target; they appreciate what we do.

Most stakeholders are tied to specific program areas but are interested in all programs offered through our office staff.

4-H youth have many fresh ideas: more than we can implement with current staff and resources.

Many motivated youth are attracted to 4-H

Areas dealing with home horticulture were important to the general public.

Small acreage ranch owners wanted assistance in developing their property.

Agricultural sustainability was important to agricultural producers, i.e. marketing, weed control, crop production and animal health issues.

Basic home making skills, i.e. cooking, sewing and money management were important to home makers in the county.

Youth leadership development and continuation of traditional 4-H programs, i.e. livestock, horse, sewing, cooking, etc., were important to county stakeholders.

Citizens appreciate the Master Gardener/Gardening programs and want them continued, they appreciate the offering of site visits for homes/businesses and/or ag farms/ranches (as reasonable and practical for the county agent), they believe the youth benefit from and enjoy the 4-H extended clubs offerings (both summer and afterschool) and want them continued.

Soil Conservation District work group indicated that highest priority was irrigated crop production.

More education is needed in family finance, marriage and relationships, parenting and mentoring programs.

Producers like to see research plots in their county grown under local climate conditions and based on their needs (safflower, oilseed and winter wheat variety trial plots are located in Box Elder County. Alfalfa variety trial plots are located in Cache Valley.)

Crop schools/workshops/field days/tours are a great way to assist in disseminating research, other information, and to gather clientele needs to assist in planning future programs.

More and more growers have email addresses and like to receive information via email.

Programs need to be personally relevant.

Public perceptions of water quality- many people feel they have no input of water quality. Many don't understand issues. They don't think about the source, just what comes out of the tap. Youth programs wanted more athletic activities. Financial classes wanted basic budgeting and debt relief information.

Urban Farming has support of County Council

We need to promote the 4-H youth development program to other organizations, families, and individuals.

The desire for more sustainable landscape designs and to do more focusing on educational experiences in the garden.

There were no Extension programs that needed to be discontinued.

They are grateful for the information that they are able to access from the University through the County programs.

We learned that stakeholders are willing and capable of taking on more responsibility for 4-H afterschool and mentoring programs.

We learned that partnering entities value Extension as a contributing resource as we strive to meet common objectives.

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>
1597174	0	2003570	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>	1597174	0	2337591	0
<b>Actual Matching</b>	1869084	0	15583749	0
<b>Actual All Other</b>	0	0	12663647	0
<b>Total Actual Expended</b>	3466258	0	30584987	0

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

**V. Planned Program Table of Content**

<b>S. No.</b>	<b>PROGRAM NAME</b>
1	Land Use and Sustainable Communities
2	Sustainable Plant Communities
3	Sustained Livestock Production
4	Plant, Animal, and Microbial Genomics
5	Production and Safety of Food Products
6	Water and Soil Conservation and Uses
7	Natural Resource Systems and the Environment
8	Production, Marketing, Trade, and International Economics
9	Individuals, Families, and Communities

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

**Program # 1**

**1. Name of the Planned Program**

Land Use and Sustainable Communities

**V(B). Program Knowledge Area(s)**

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
131	Alternative Uses of Land	12%		15%	
608	Community Resource Planning and Development	63%		60%	
610	Domestic Policy Analysis	0%		10%	
803	Sociological and Technological Change Affecting Individuals, Families, and Communities	25%		15%	
<b>Total</b>		100%		100%	

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

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

Year: 2009	Extension		Research	
	1862	1890	1862	1890
Plan	12.0	0.0	2.7	0.0
Actual	12.0	0.0	3.0	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
108898	0	72069	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
127438	0	462219	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	585302	0

**V(D). Planned Program (Activity)**

**1. Brief description of the Activity**

1. Conduct research experiments and/or develop theories that can be used to explain (a) causes for public land conflicts and potential solutions, (b) solutions to the urban expansion into rural areas and open space, and (c) conditions for continued rural community economic viability.

2. Publish studies and make presentations related to these areas of concern.

3. Conduct workshops and meetings to educate local, state, and regional stakeholders concerning these issues.

4. Deliver educational and informational services through various media.
5. Develop educational resources related to rural economic viability for community leaders and other stakeholders
6. Provide for local training in principles developed that are related to this area of study.
7. Conduct design activities (for a park, a Main Street revitalization, etc.) that will typically yield a design of variable specificity (some might be conceptual drawings, others might be more extensive).
8. Provide consultations regarding land use planning policies and their implications on growth.

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

The target audience for this work will be community leaders, community, state and federal policy makers, at-large public, academic units, private land holders, public land users, businesses, and local, state, and regional political leaders. Establishing joint efforts with public and private interests in the community will be important in establishing the needed credibility for adoption of recommended practices or acceptance of alternative designs.

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

**1. Standard output measures**

2009	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
<b>Plan</b>	14000	1800	10000	1600
<b>Actual</b>	19699	57386	433	601

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

**Patent Applications Submitted**

Year: 2009  
 Plan: 0  
 Actual: 0

**Patents listed**

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

**Number of Peer Reviewed Publications**

2009	Extension	Research	Total
<b>Plan</b>	0	30	
<b>Actual</b>	0	27	27

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

**Output Target**

**Output #1**

**Output Measure**

- Number of peer-reviewed journal articles and books/chapters in books extensively peer reviewed

Year	Target	Actual
2009	30	27



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

- Number of intermediate publications and presentations (i.e., refereed proceedings).

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2009	40	32

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

- Level of contract/grant funding

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2009	1000000	585302

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

- Number of graduate students trained

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2009	15	9

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

- Number of undergraduate students involved in research

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2009	5	7

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

- Number of theses/dissertations completed

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2009	4	4

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

O. No.	OUTCOME NAME
1	Number of clients gaining land use and sustainable communities knowledge.
2	Number of clients who implement land use and sustainable communities practices
3	Number of communities preserving desirable community attributes
4	Improvement in rural community vitality as measured by convergence of urban/rural family-level income (i.e., closure in differences expressed in percent/year terms).

**Outcome #1**

**1. Outcome Measures**

Number of clients gaining land use and sustainable communities knowledge.

**2. Associated Institution Types**

- 1862 Extension
- 1862 Research

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

Year	Quantitative Target	Actual
2009	7600	23480

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

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
131	Alternative Uses of Land
608	Community Resource Planning and Development
610	Domestic Policy Analysis
803	Sociological and Technological Change Affecting Individuals, Families, and Communities

**Outcome #2**

**1. Outcome Measures**

Number of clients who implement land use and sustainable communities practices

**2. Associated Institution Types**

- 1862 Extension
- 1862 Research

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

Year	Quantitative Target	Actual
2009	1300	2459

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

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
131	Alternative Uses of Land
608	Community Resource Planning and Development
610	Domestic Policy Analysis
803	Sociological and Technological Change Affecting Individuals, Families, and Communities

**Outcome #3**

**1. Outcome Measures**

Number of communities preserving desirable community attributes

**2. Associated Institution Types**

- 1862 Extension
- 1862 Research

**3a. Outcome Type:**

Change in Condition Outcome Measure

**3b. Quantitative Outcome**

Year	Quantitative Target	Actual
2009	2	2

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

**Issue (Who cares and Why)**

Communities along a 25 mile corridor leading to Zion's National Park are impacted by millions of tourists each year. County, state, and local officials need to update and revise zoning ordinances and general plans in order to preserve desirable community attributes of the four communities located along the corridor.

**What has been done**

USU Extension developed three alternative futures for the four rural communities along the corridor leading into Zions Canyons. USU Extension, along with the USU Landscape Architecture and Environmental Design (LAED) students visited the study area to conduct interviews, attend meetings, hand out surveys and explore the canyon

and its communities. They met with mayors and city council members and other organizations. With the data collected the students developed alternative futures for the corridor. They developed a report that includes Guidance Information System (GIS) mapping for three alternative futures.

### Results

The Five County Association of Governments, county, state and each of the four communities use the study to guide revisions to their zoning ordinances and general plans.

## 4. Associated Knowledge Areas

KA Code	Knowledge Area
131	Alternative Uses of Land
608	Community Resource Planning and Development
803	Sociological and Technological Change Affecting Individuals, Families, and Communities

## Outcome #4

### 1. Outcome Measures

Improvement in rural community vitality as measured by convergence of urban/rural family-level income (i.e., closure in differences expressed in percent/year terms).

Not Reporting on this Outcome Measure

## 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

There have been so many factors that have influenced our ability to follow through on the goals that were set. We have received a 17% reduction in budget from state sources. County-level budgets have also been dramatically impacted. The southern portion of the state experienced a severe drought, a continuation of the past several years. Competing public priorities (primarily social programs and prisons) have further reduced budgets to CES and UAES. The composition of the state's population continues to change, with a higher immigration and in-migration of Individuals outside the goal and program areas established in previous years. These and other factors have combined to reduce the effectiveness of goal attainment, though all goals were achieved to some extent.

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

### 1. Evaluation Studies Planned

- Retrospective (post program)
- Before-After (before and after program)

- During (during program)
- Time series (multiple points before and after program)
- Case Study
- Comparison between locales where the program operates and sites without program intervention

**Evaluation Results**

{No Data Entered}

**Key Items of Evaluation**

{No Data Entered}

**V(A). Planned Program (Summary)****Program # 2****1. Name of the Planned Program**

Sustainable Plant Communities

**V(B). Program Knowledge Area(s)****1. Program Knowledge Areas and Percentage**

<b>KA Code</b>	<b>Knowledge Area</b>	<b>%1862 Extension</b>	<b>%1890 Extension</b>	<b>%1862 Research</b>	<b>%1890 Research</b>
201	Plant Genome, Genetics, and Genetic Mechanisms	0%		5%	
202	Plant Genetic Resources	0%		10%	
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants	0%		5%	
204	Plant Product Quality and Utility (Preharvest)	0%		10%	
205	Plant Management Systems	89%		10%	
206	Basic Plant Biology	0%		5%	
211	Insects, Mites, and Other Arthropods Affecting Plants	5%		10%	
212	Pathogens and Nematodes Affecting Plants	0%		5%	
213	Weeds Affecting Plants	1%		10%	
214	Vertebrates, Mollusks, and Other Pests Affecting Plants	0%		10%	
215	Biological Control of Pests Affecting Plants	0%		10%	
216	Integrated Pest Management Systems	5%		10%	
	<b>Total</b>	100%		100%	

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

<b>Year: 2009</b>	<b>Extension</b>		<b>Research</b>	
	<b>1862</b>	<b>1890</b>	<b>1862</b>	<b>1890</b>
Plan	37.0	0.0	12.2	0.0
Actual	43.0	0.0	10.8	0.0

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

Extension		Research	
<b>Smith-Lever 3b &amp; 3c</b> 390219	<b>1890 Extension</b> 0	<b>Hatch</b> 416794	<b>Evans-Allen</b> 0
<b>1862 Matching</b> 456651	<b>1890 Matching</b> 0	<b>1862 Matching</b> 3034076	<b>1890 Matching</b> 0
<b>1862 All Other</b> 0	<b>1890 All Other</b> 0	<b>1862 All Other</b> 3978071	<b>1890 All Other</b> 0

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

1. Conduct research experiments with plants and plant material.
2. Publish studies and make presentations related to plant propagation and production.
3. Conduct workshops and meetings to educate local, state, and regional stakeholders concerning progress in producing plants that are economically viable and environmentally friendly.
4. Deliver educational resources through various media
5. Release new plant varieties relative to this program area under plant variety protection (PVP) status.
6. Expand use of Integrated Pest Management (IPM).
7. Provide "Orchard Pest Advisories" on over 15 insect, mite, and pathogen pests of tree fruit and small fruit crops (commercial and home garden).
8. Provide pest diagnostic assistance and management information to county agents, state and federal partners, commercial agriculture and horticulture producers, and the general public through the Utah Plant Pest Diagnostic Laboratory.
9. Certify or recertify Pesticide Applicator Training (PAT) for pesticide applicators to apply restricted use pesticides and to comply with the Utah Pesticide Control Act and the Federal Insecticide, Fungicide, and Rodenticide Act.
10. Coordinate efforts with other states and the Western Region Pest Management Center (WRPMC).
11. Enhance the USU Master and 4-H Junior Master Gardener Programs.
12. Conserving water in the landscape through appropriate landscape management and plant selection with regard to turfgrass management.
13. Develop a manual that would meet the needs of industry professionals seeking certification as a Utah Certified Nursery Professional
14. Collaborate with the Utah Nursery and Landscape Association in an annual conference and trade show to illustrate "best management practices."
15. Continue the Western SARE Program.
16. Expand the Geospatial Extension Program.
17. Utilize multiple demonstrations/applied research plots to manage weeds in agronomic crops with results reported at field days, workshops, or annual meetings.
18. Continue to use traditional crop breeding approaches to develop plants that are more tolerant to salinity, drought, and grazing.

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

The target audience for this work would be other scientists, agricultural producers, landscapers, general public, home owners, green industry officials, professional landscape managers, turfgrass sod producers, other private businesses, and government entities that conduct work in this area.

**V(E). Planned Program (Outputs)****1. Standard output measures**



2009	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
<b>Plan</b>	49000	580000	10000	116000
<b>Actual</b>	63339	1404363	12711	291792

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

Year: 2009

Plan: 0

Actual: 0

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

2009	Extension	Research	Total
<b>Plan</b>	0	15	
<b>Actual</b>	0	17	17

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

- Number of variety or seed releases

Year	Target	Actual
2009	2	4

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

- Number of peer-reviewed journal articles and books/chapters in books extensively peer reviewed

Year	Target	Actual
2009	15	32

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

- Number of intermediate publications and presentations (i.e., refereed proceedings)  
Not reporting on this Output for this Annual Report

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

- Level of contract/grant funding  
Not reporting on this Output for this Annual Report

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

- Number of graduate students or post-doctorate's trained

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2009	12	17

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

- Number of PVP's (Plant Variety Protection) established

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2009	1	3

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

- Number of undergraduate students involved in research

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2009	4	12

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

- Number of theses/dissertations completed

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2009	4	6

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

<b>O. No.</b>	<b>OUTCOME NAME</b>
1	Number of clients (growers, government agency personnel, home orchardists, and others) increasing their knowledge of sustained plant production.
2	Number of times clients (growers, government agency personnel, home orchardists, and others) implement one or more sustained plant production practice(s).
3	Percentage increase in crop cash receipts (based on 1999-2004 average aggregate receipts).
4	Percentage increase in overall crop productivity (based on 1999-2004 average aggregate output).

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

Number of clients (growers, government agency personnel, home orchardists, and others) increasing their knowledge of sustained plant production.

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

Year	Quantitative Target	Actual
2009	30000	45388

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

It is important to secure minor use registrations for agricultural producers for legal reasons and also to increase grower productivity and profitability. By law, any use of a pesticide must be stated on the label or allowed for by regulation. Each label use instruction must be registered by the EPA. The registration requires proof that the pesticide use poses no undue hazard when applied as instructed. Registration data costs for most pesticide uses are paid by the pesticide manufacturers who expect to sell enough product to return a profit. Many uses for pesticides, however, are on such a small scale that their registration costs are greater than any possible return to the manufacturer. Even these small or minor uses require registration to protect the applicator from a possible fine or crop residue problem.

**What has been done**

USU developed the data necessary for submitting minor crop pest control options to the EPA for approval. The program was expanded to include ornamentals and also, biopesticides including microbials like bacteria and viruses, and biochemicals like pheromones and growth regulators. USU Extension and USU Agricultural Experiment Station works with farmers, agricultural scientists, commodity organizations, and extension personnel to provide pest management solutions to growers of minor crops.

**Results**

This program has helped in securing clearances for registration of certain pesticide uses on these Utah crops: alfalfa, apple, apricot, asparagus, bean (dry), broccoli, brussels sprouts, cabbage, cane berry, canola, cantaloupe, carrot, cauliflower, cherry (sweet), cherry (tart), clover, field corn, honey and beeswax, honeydew melons, lettuce, onion (dry), pasture grass, peach, pear, plum, potato, pumpkin, range grass, raspberry, safflower, snap bean, spinach, squash (winter/summer), sweet corn, tomato and watermelon. Potential economic losses of \$11,900,000 are estimated without this program. These additional registrations help maintain a high quality and varied supply of food, feed, and fiber and help to manage cases of pest resistance.

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
201	Plant Genome, Genetics, and Genetic Mechanisms
202	Plant Genetic Resources
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants

204	Plant Product Quality and Utility (Preharvest)
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Pathogens and Nematodes Affecting Plants
213	Weeds Affecting Plants
215	Biological Control of Pests Affecting Plants
216	Integrated Pest Management Systems

## **Outcome #2**

### **1. Outcome Measures**

Number of times clients (growers, government agency personnel, home orchardists, and others) implement one or more sustained plant production practice(s).

### **2. Associated Institution Types**

- 1862 Extension
- 1862 Research

### **3a. Outcome Type:**

Change in Action Outcome Measure

### **3b. Quantitative Outcome**

<b>Year</b>	<b>Quantitative Target</b>	<b>Actual</b>
2009	15000	26403

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

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

Iris yellow spot virus (IYSV) and thrips are high priority pests on more than 65,000 hectares of onion (bulb and green) grown throughout the United States. Yield losses and economic costs from these pests are estimated to exceed 70 million dollars annually, unless diagnosed accurately, monitored efficiently, and managed with timely Integrated Pest Management (IPM) strategies. U.S. Infestations of onion thrips is the most common cause for insecticide use in dry bulb onion production in the western U.S.

#### **What has been done**

A national network of onion and allium researchers, extension personnel and industry representatives are exploring solutions to the growing problem of Iris Yellow Spot Virus and Thrips transmission. These partners are studying options for sustainable and profitable management strategies for IYSV, thrips and other pests and diseases.

#### **Results**

As a result of USU Extension and UAES, Utah onion growers have switched their primary onion thrips pest management strategy from sole reliance on repetitious insecticide applications to crop management (especially nitrogen and irrigation management), biological control, and rotations of reduced-risk insecticides. Two growers report that they now are growing their onions (260 acres; 20% of Utah Acreage) with reduced nitrogen applications while still maintaining good yields. This acreage is not being sprayed with insecticides and growers report that thrips numbers are low, and IYSV is not a problem. With these management changes, growers report production costs reduced by about \$1000/acre for a savings of \$260,000. Reduced insecticide use contributes to environmental impacts by reducing non-target effects on beneficial insects, water and soil quality, and ecosystem health and reduces human exposure to pesticides from farm applicators to onion consumers.

#### 4. Associated Knowledge Areas

KA Code	Knowledge Area
201	Plant Genome, Genetics, and Genetic Mechanisms
202	Plant Genetic Resources
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
204	Plant Product Quality and Utility (Preharvest)
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Pathogens and Nematodes Affecting Plants
213	Weeds Affecting Plants
215	Biological Control of Pests Affecting Plants
216	Integrated Pest Management Systems

#### Outcome #3

##### 1. Outcome Measures

Percentage increase in crop cash receipts (based on 1999-2004 average aggregate receipts).

Not Reporting on this Outcome Measure

#### Outcome #4

##### 1. Outcome Measures

Percentage increase in overall crop productivity (based on 1999-2004 average aggregate output).

##### 2. Associated Institution Types

- 1862 Extension
- 1862 Research

##### 3a. Outcome Type:

Change in Condition Outcome Measure

##### 3b. Quantitative Outcome

Year	Quantitative Target	Actual
2009	2	1

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

**Issue (Who cares and Why)**

**What has been done**

**Results**

#### 4. Associated Knowledge Areas

KA Code	Knowledge Area
201	Plant Genome, Genetics, and Genetic Mechanisms
202	Plant Genetic Resources
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
204	Plant Product Quality and Utility (Preharvest)
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Pathogens and Nematodes Affecting Plants
213	Weeds Affecting Plants
215	Biological Control of Pests Affecting Plants
216	Integrated Pest Management Systems

#### 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.)
- Other (weeds, biofuels)

##### Brief Explanation

There have been so many factors that have influenced our ability to follow through on the goals that were set. We have received a 17% reduction in budget from state sources. County-level budgets have also been dramatically impacted. The southern portion of the state experienced a severe drought, a continuation of the past several years. Competing public priorities (primarily social programs and prisons) have further reduced budgets to CES and UAES. The composition of the state's population continues to change, with a higher immigration and in-migration of Individuals outside the goal and program areas established in previous years. Finally, there has been additional emphasis given to the development of biofuels. Weeds, particularly on public lands, are an expanding threat to rangeland productivity. These and other factors have combined to reduce the effectiveness of goal attainment, though all goals were achieved to some extent.

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

##### 1. Evaluation Studies Planned

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

- Comparisons between program participants (individuals, group, organizations) and non-participants
- Comparison between locales where the program operates and sites without program intervention

**Evaluation Results**

{No Data Entered}

**Key Items of Evaluation**

{No Data Entered}



**V(A). Planned Program (Summary)****Program # 3****1. Name of the Planned Program**

Sustained Livestock Production

**V(B). Program Knowledge Area(s)**

## 1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
301	Reproductive Performance of Animals	0%		10%	
302	Nutrient Utilization in Animals	13%		10%	
303	Genetic Improvement of Animals	0%		10%	
305	Animal Physiological Processes	0%		10%	
306	Environmental Stress in Animals	0%		5%	
307	Animal Management Systems	84%		15%	
308	Improved Animal Products (Before Harvest)	0%		10%	
311	Animal Diseases	2%		10%	
312	External Parasites and Pests of Animals	0%		5%	
313	Internal Parasites in Animals	0%		5%	
314	Toxic Chemicals, Poisonous Plants, Naturally Occurring Toxins, and Other Hazards Affecting Animals	0%		5%	
402	Engineering Systems and Equipment	1%		0%	
722	Zoonotic Diseases and Parasites Affecting Humans	0%		5%	
	<b>Total</b>	100%		100%	

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

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

Year: 2009	Extension		Research	
	1862	1890	1862	1890
Plan	42.0	0.0	10.6	0.0
Actual	25.0	0.0	6.1	0.0

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

Extension		Research	
<b>Smith-Lever 3b &amp; 3c</b> 226871	<b>1890 Extension</b> 0	<b>Hatch</b> 145817	<b>Evans-Allen</b> 0
<b>1862 Matching</b> 265495	<b>1890 Matching</b> 0	<b>1862 Matching</b> 1493766	<b>1890 Matching</b> 0
<b>1862 All Other</b> 0	<b>1890 All Other</b> 0	<b>1862 All Other</b> 894139	<b>1890 All Other</b> 0

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

The Utah Agricultural Experiment Station will:

1. Conduct research experiments and develop theories that can be used to enhance livestock production in an environmentally friendly manner.

2. Publish studies and make presentations related to this research.

3. It is expected that this research will eventually result in one patent issued in year 2011/year.

Extension will outreach to adult and youth producers and provide educational training, farm and ranch visits, and in-depth applied information on:

1. Dairy management and related topics

2. Beef Quality Assurance principles to beef producers

3. Master Beef Managers

4. Master Livestock Managers

5. Understanding and ability to keep and use farm records

6. Optimal production techniques for year round turkey production

7. The threat of foreign animal diseases and the role and methods of biosecurity for control and prevention

8. Disease and pest control

9. Agrarian and equine needs of small acreage owners

10. Sheep and goats

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

The target audience for this work would be local and regional livestock (primarily beef, dairy, and equine) producers, small acreage owners, 4-H youth, veterinarians, USDA, state policy makers, academic units, businesses, and local, state, and regional political leaders.

**V(E). Planned Program (Outputs)****1. Standard output measures**

2009	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
<b>Plan</b>	22000	72000	6300	15000
<b>Actual</b>	18328	64565	1487	5854

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

Year: 2009

Plan: 1

Actual: 0

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

<b>2009</b>	<b>Extension</b>	<b>Research</b>	<b>Total</b>
<b>Plan</b>	0	10	
<b>Actual</b>	0	6	6

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

- Number of peer-reviewed journal articles and books/chapters in books extensively peer reviewed

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2009	10	6

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

- Number of intermediate publications and presentations (i.e., refereed proceedings).  
Not reporting on this Output for this Annual Report

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

- Level of contract/grant funding

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2009	200000	298990

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

- Number of graduate students or post-doctorate's trained

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2009	10	10

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

- Number of undergraduate students involved in research

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2009	3	3

**Output #6**

**Output Measure**

- Number of theses/dissertations completed

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2009	2	2

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

<b>O. No.</b>	<b>OUTCOME NAME</b>
1	Number of agricultural animal owners increasing their knowledge of sustained animal production practices.
2	Number of times agricultural animal owners implemented one or more sustained animal production practices.
3	Improvement in livestock productivity (i.e., pounds of beef or milk produced per animal per year, expressed in percentage terms).
4	Improvement in cash receipts from livestock production relative to average of 1999-2004 production years.

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

Number of agricultural animal owners increasing their knowledge of sustained animal production practices.

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

Year	Quantitative Target	Actual
2009	10000	9883

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

Agriculture and the beef cattle industry in North America and the world have undergone significant changes, particularly over the last few years. Viability and sustainability of beef production in the western U.S. can be increased if feed costs are decreased. The fact that feed is the single largest input cost has a high impact on profitability. Utah beef producers use traditional forage-based production that provides range and feed supplies for the majority of the cattle within the state. Efficient production by producers is imperative if they are to remain competitive.

**What has been done**

Master Beef Manager Classes were held by USU teaching about livestock handling and facilities, bio-security, and financial and production record keeping.

**Results**

Producers report that research based information provided by USU Extension helps them plan their livestock marketing strategies as well as their cropping strategies. Information and training in QuickBooks, balanced rations, control of noxious weeds, and cost/benefit analysis have helped farmers to cut costs and improve production. As a result of these activities farmers attending USU Extension programs are spending more time looking at their operations and finding ways to cut costs and improve production.

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
301	Reproductive Performance of Animals
302	Nutrient Utilization in Animals
303	Genetic Improvement of Animals
305	Animal Physiological Processes
306	Environmental Stress in Animals
307	Animal Management Systems
311	Animal Diseases
314	Toxic Chemicals, Poisonous Plants, Naturally Occurring Toxins, and Other Hazards Affecting Animals

- 402 Engineering Systems and Equipment
- 722 Zoonotic Diseases and Parasites Affecting Humans

**Outcome #2**

**1. Outcome Measures**

Number of times agricultural animal owners implemented one or more sustained animal production practices.

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

Year	Quantitative Target	Actual
2009	4000	4610

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

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
301	Reproductive Performance of Animals
302	Nutrient Utilization in Animals
303	Genetic Improvement of Animals
305	Animal Physiological Processes
306	Environmental Stress in Animals
307	Animal Management Systems
311	Animal Diseases
314	Toxic Chemicals, Poisonous Plants, Naturally Occurring Toxins, and Other Hazards Affecting Animals
402	Engineering Systems and Equipment
722	Zoonotic Diseases and Parasites Affecting Humans

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

Improvement in livestock productivity (i.e., pounds of beef or milk produced per animal per year, expressed in percentage terms).

**2. Associated Institution Types**

- 1862 Extension
- 1862 Research

**3a. Outcome Type:**

Change in Condition Outcome Measure

**3b. Quantitative Outcome**

Year	Quantitative Target	Actual
2009	3	1

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

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
301	Reproductive Performance of Animals
302	Nutrient Utilization in Animals
303	Genetic Improvement of Animals
305	Animal Physiological Processes
306	Environmental Stress in Animals
307	Animal Management Systems
308	Improved Animal Products (Before Harvest)
311	Animal Diseases
312	External Parasites and Pests of Animals
313	Internal Parasites in Animals
314	Toxic Chemicals, Poisonous Plants, Naturally Occurring Toxins, and Other Hazards Affecting Animals
402	Engineering Systems and Equipment
722	Zoonotic Diseases and Parasites Affecting Humans



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

Improvement in cash receipts from livestock production relative to average of 1999-2004 production years.

**2. Associated Institution Types**

- 1862 Extension
- 1862 Research

**3a. Outcome Type:**

Change in Condition Outcome Measure

**3b. Quantitative Outcome**

Year	Quantitative Target	Actual
2009	2	0

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

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
301	Reproductive Performance of Animals
302	Nutrient Utilization in Animals
303	Genetic Improvement of Animals
305	Animal Physiological Processes
306	Environmental Stress in Animals
307	Animal Management Systems
308	Improved Animal Products (Before Harvest)
311	Animal Diseases
312	External Parasites and Pests of Animals
313	Internal Parasites in Animals
314	Toxic Chemicals, Poisonous Plants, Naturally Occurring Toxins, and Other Hazards Affecting Animals
402	Engineering Systems and Equipment
722	Zoonotic Diseases and Parasites Affecting Humans

## 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.)
- Other (Diseases; Invasive Species)

### Brief Explanation

There have been so many factors that have influenced our ability to follow through on the goals that were set. We have received a 17% reduction in budget from state sources. County-level budgets have also been dramatically impacted. The southern portion of the state experienced a severe drought, a continuation of the past several years. Competing public priorities (primarily social programs and prisons) have further reduced budgets to CES and UAES. The composition of the state's population continues to change, with a higher immigration and in-migration of Individuals outside the goal and program areas established in previous years. Diseases continue to evolve and still are a significant problem. With public and private lands being taken over by invasive species, productivity of those lands are greatly impacted, meaning livestock productivity has diminished on these lands. These and other factors have combined to reduce the effectiveness of goal attainment, though all goals were achieved to some extent.

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

### 1. Evaluation Studies Planned

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

### Evaluation Results

{No Data Entered}

### Key Items of Evaluation

{No Data Entered}

**V(A). Planned Program (Summary)****Program # 4****1. Name of the Planned Program**

Plant, Animal, and Microbial Genomics

**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	25%		25%	
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants	5%		5%	
301	Reproductive Performance of Animals	15%		15%	
303	Genetic Improvement of Animals	20%		20%	
304	Animal Genome	20%		20%	
305	Animal Physiological Processes	5%		5%	
501	New and Improved Food Processing Technologies	10%		10%	
<b>Total</b>		100%		100%	

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

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

Year: 2009	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.0	14.0	0.0
Actual	0.0	0.0	5.5	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
0	0	282983	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	1906166	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	298990	0

**V(D). Planned Program (Activity)**

## 1. Brief description of the Activity

1. Conduct research experiments and develop theories that can be used to enhance plant and animal productive efficiencies.

2. Publish studies related to these areas of concern.
3. Conduct workshops and meetings for other scientists involved in this area of research.
4. Develop applications for the research on plant and animal genomics to directly benefit producers, youths, and other scientists.

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

The target audience for this research will primarily be other scientists involved in genomics work but the gains achieved will eventually be available to the general public as these technologies become commercialized. Other interested parties include numerous businesses related to this area of research. The eventual end-user, i.e., the producer or food processor, will realize benefits from the research long term.

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

**1. Standard output measures**

2009	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Plan	35	60	22	40
Actual	0	0	0	0

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

**Patent Applications Submitted**

Year: 2009  
 Plan: 1  
 Actual: 0

**Patents listed**

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

**Number of Peer Reviewed Publications**

2009	Extension	Research	Total
Plan	0	60	
Actual	0	62	62

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

**Output Target**

**Output #1**

**Output Measure**

- Number of peer-reviewed journal articles and books/chapters in books extensively peer reviewed

Year	Target	Actual
2009	60	62

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

- Number of intermediate publications and presentations (e.g., refereed proceedings)

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2009	60	45

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

- Level of contract/grant funding

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2009	300000	1252073

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

- Number of graduate students or post-doctorate's trained

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2009	20	9

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

- Number of undergraduate students involved in research

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2009	5	12

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

- Number of theses/dissertations completed

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2009	3	3

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

O. No.	OUTCOME NAME
1	Increase in productivity (plant and animal) per year (expressed in percentage terms) due to enhanced genetical capacity.

## **Outcome #1**

### **1. Outcome Measures**

Increase in productivity (plant and animal) per year (expressed in percentage terms) due to enhanced genetical capacity.

Not Reporting on this Outcome Measure

### **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

#### **Brief Explanation**

There have been so many factors that have influenced our ability to follow through on the goals that were set. We have received a 17% reduction in budget from state sources. County-level budgets have also been dramatically impacted. Competing public priorities (primarily social programs and prisons) have further reduced budgets to CES and UAES. Diseases continue to evolve and remain a significant problem. These and other factors have combined to reduce the effectiveness of goal attainment, though all goals were achieved to some extent.

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

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

- During (during program)
- Time series (multiple points before and after program)
- Case Study
- Comparisons between program participants (individuals, group, organizations) and non-participants

#### **Evaluation Results**

{No Data Entered}

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

{No Data Entered}

**V(A). Planned Program (Summary)****Program # 5****1. Name of the Planned Program**

Production and Safety of Food Products

**V(B). Program Knowledge Area(s)**

## 1. Program Knowledge Areas and Percentage

<b>KA Code</b>	<b>Knowledge Area</b>	<b>%1862 Extension</b>	<b>%1890 Extension</b>	<b>%1862 Research</b>	<b>%1890 Research</b>
501	New and Improved Food Processing Technologies	0%		20%	
502	New and Improved Food Products	0%		20%	
503	Quality Maintenance in Storing and Marketing Food Products	0%		5%	
504	Home and Commercial Food Service	75%		0%	
511	New and Improved Non-Food Products and Processes	0%		15%	
701	Nutrient Composition of Food	0%		15%	
702	Requirements and Function of Nutrients and Other Food Components	0%		10%	
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources	0%		5%	
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins	25%		10%	
<b>Total</b>		100%		100%	

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

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

<b>Year: 2009</b>	<b>Extension</b>		<b>Research</b>	
	<b>1862</b>	<b>1890</b>	<b>1862</b>	<b>1890</b>
Plan	1.0	0.0	7.5	0.0
Actual	1.0	0.0	17.4	0.0

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



Extension		Research	
<b>Smith-Lever 3b &amp; 3c</b> 9075	<b>1890 Extension</b> 0	<b>Hatch</b> 595729	<b>Evans-Allen</b> 0
<b>1862 Matching</b> 10620	<b>1890 Matching</b> 0	<b>1862 Matching</b> 3795582	<b>1890 Matching</b> 0
<b>1862 All Other</b> 0	<b>1890 All Other</b> 0	<b>1862 All Other</b> 5169538	<b>1890 All Other</b> 0

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

The experiment station will:

1. Conduct experiments and develop theories that can be used to develop a safer food supply from production, through processing, and to the final consumer.
2. Conduct experiments and develop theories that can be used to develop new food products or improve existing food products.
3. Publish studies and make presentations related to these two areas of concern.

Extension will outreach to Utah residents, family consumer scientist agents, small and medium sized food processors, restaurant food safety managers to provide educational training and in-depth information on:

1. Safe food handling practices
2. Safe food preservation and storage practices
3. Certification to food safety managers
4. Safe food handling practices for processors
5. 4-H nutrition and health safety curricula and programs

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

The target audience will include food processors, agricultural producers, general consumers (both within and without Utah), family consumer science agents, at risk groups and their families, 4-H youth, and other scientists.

**V(E). Planned Program (Outputs)****1. Standard output measures**

2009	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
<b>Plan</b>	2800	3400	900	1700
<b>Actual</b>	3421	13033	2965	237

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

Year: 2009  
Plan: 1  
Actual: 2

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

**Number of Peer Reviewed Publications**

<b>2009</b>	<b>Extension</b>	<b>Research</b>	<b>Total</b>
<b>Plan</b>	0	15	
<b>Actual</b>	0	23	23

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

- Number of peer-reviewed journal articles and books/chapters in books extensively peer reviewed

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2009	15	23

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

- Number of intermediate publications and presentations (e.g., refereed proceedings).

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2009	15	12

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

- Level of contract/grant funding

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2009	50000	5169538

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

- Number of graduate students or post-doctorate's trained

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2009	12	17

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

- Number of undergraduate students involved in research

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2009	4	7

**Output #6**

**Output Measure**

- Number of theses/dissertations completed

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2009	4	4

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

O. No.	OUTCOME NAME
1	Number of clients who increase their knowledge of production and safety of food products.
2	Number of clients who implement positive food safety practices.
3	Number of cases per 100,000 population of food borne illness in Utah less than the 2005 UIBI-PH indicators for campylobacteriosis (expressed as percentage of population).
4	Number of cases per 100,000 population of food borne illness in Utah less than the 2005 UIBI-PH indicators for E. Coli (expressed as percent of population).
5	Number of cases per 100,000 population of food borne illness in Utah less than the 2005 UIBI-PH indicators for salmonella (expressed as percentage of population).

**Outcome #1**

**1. Outcome Measures**

Number of clients who increase their knowledge of production and safety of food products.

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

Year	Quantitative Target	Actual
2009	1500	1998

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

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
501	New and Improved Food Processing Technologies
511	New and Improved Non-Food Products and Processes
701	Nutrient Composition of Food
702	Requirements and Function of Nutrients and Other Food Components
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins

**Outcome #2**

**1. Outcome Measures**

Number of clients who implement positive food safety practices.

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

Year	Quantitative Target	Actual
2009	800	1862

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

The Centers for Disease Control and Prevention (CDC) estimates that in the United States 76 million foodborne illnesses occur every year. This may cost as high as 40 billion dollars annually due to lost productivity and direct health expenses. While most people believe that manufacturers are the main source of foodborne illness the truth is that greater than 70% are caused in food service and in the home.

**What has been done**

UAES researchers and UCES staff have major programs aimed at home food safety and retail foodservice food safety. Both programs are addressed at the state level and at the county level. The home food safety program includes home food preservation, storage, and food preparation. Each County provides direct educational programming based on research based results, such as seminars, to consumers to increase food safety knowledge and change behavior. Educational programs include safe hand washing, safe home canning, safe food storage, and safe food preparation (cook, clean, chill, and separate).

**Results**

Adult participants in the Utah Food Sense Program had significant improvement in the following food safety practices:

- Refrigerate meat and dairy within 2 hours of shopping.
- Thaw foods properly, Do not thaw frozen foods at room temperatures.
- Wash hands before food preparation or eating.
- Prepare raw foods separately from other foods.

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
501	New and Improved Food Processing Technologies
511	New and Improved Non-Food Products and Processes
701	Nutrient Composition of Food
702	Requirements and Function of Nutrients and Other Food Components
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins

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

Number of cases per 100,000 population of food borne illness in Utah less than the 2005 UIBI-PH indicators for campylobacteriosis (expressed as percentage of population).

**2. Associated Institution Types**

- 1862 Extension
- 1862 Research

**3a. Outcome Type:**

Change in Condition Outcome Measure

**3b. Quantitative Outcome**

Year	Quantitative Target	Actual
2009	11	13

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

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
501	New and Improved Food Processing Technologies
502	New and Improved Food Products
503	Quality Maintenance in Storing and Marketing Food Products
504	Home and Commercial Food Service
511	New and Improved Non-Food Products and Processes
701	Nutrient Composition of Food
702	Requirements and Function of Nutrients and Other Food Components
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins

**Outcome #4**

**1. Outcome Measures**

Number of cases per 100,000 population of food borne illness in Utah less than the 2005 UIBI-PH indicators for E. Coli (expressed as percent of population).

**2. Associated Institution Types**

- 1862 Extension
- 1862 Research

**3a. Outcome Type:**

Change in Condition Outcome Measure

**3b. Quantitative Outcome**

Year	Quantitative Target	Actual
2009	1	2

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

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
501	New and Improved Food Processing Technologies
502	New and Improved Food Products
503	Quality Maintenance in Storing and Marketing Food Products
511	New and Improved Non-Food Products and Processes
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins

**Outcome #5**

**1. Outcome Measures**

Number of cases per 100,000 population of food borne illness in Utah less than the 2005 UIBI-PH indicators for salmonella (expressed as percentage of population).

**2. Associated Institution Types**

- 1862 Extension
- 1862 Research

**3a. Outcome Type:**

Change in Condition Outcome Measure

**3b. Quantitative Outcome**

Year	Quantitative Target	Actual
2009	12	13

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

**Issue (Who cares and Why)**

**What has been done**

**Results**



#### 4. Associated Knowledge Areas

KA Code	Knowledge Area
501	New and Improved Food Processing Technologies
502	New and Improved Food Products
503	Quality Maintenance in Storing and Marketing Food Products
504	Home and Commercial Food Service
511	New and Improved Non-Food Products and Processes
702	Requirements and Function of Nutrients and Other Food Components
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins

#### 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

There have been so many factors that have influenced our ability to follow through on the goals that were set. We have received a 17% reduction in budget from state sources. County-level budgets have also been dramatically impacted. Competing public priorities (primarily social programs and prisons) have further reduced budgets to CES and UAES. The composition of the state's population continues to change, with a higher immigration and in-migration of individuals outside the goal and program areas established in previous years. These and other factors have combined to reduce the effectiveness of goal attainment, though all goals were achieved to some extent.

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

##### 1. Evaluation Studies Planned

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

**Evaluation Results**

{No Data Entered}

**Key Items of Evaluation**

{No Data Entered}

**V(A). Planned Program (Summary)****Program # 6****1. Name of the Planned Program**

Water and Soil Conservation and Uses

**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	2%		10%	
102	Soil, Plant, Water, Nutrient Relationships	2%		15%	
103	Management of Saline and Sodic Soils and Salinity	0%		10%	
104	Protect Soil from Harmful Effects of Natural Elements	0%		5%	
111	Conservation and Efficient Use of Water	4%		15%	
112	Watershed Protection and Management	6%		5%	
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants	0%		5%	
205	Plant Management Systems	83%		10%	
213	Weeds Affecting Plants	0%		10%	
404	Instrumentation and Control Systems	0%		5%	
405	Drainage and Irrigation Systems and Facilities	2%		5%	
605	Natural Resource and Environmental Economics	1%		5%	
	<b>Total</b>	100%		100%	

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

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

Year: 2009	Extension		Research	
	1862	1890	1862	1890
Plan	7.0	0.0	7.5	0.0
Actual	18.0	0.0	5.9	0.0

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

Extension		Research	
<b>Smith-Lever 3b &amp; 3c</b> 163347	<b>1890 Extension</b> 0	<b>Hatch</b> 193641	<b>Evans-Allen</b> 0
<b>1862 Matching</b> 191156	<b>1890 Matching</b> 0	<b>1862 Matching</b> 2081007	<b>1890 Matching</b> 0
<b>1862 All Other</b> 0	<b>1890 All Other</b> 0	<b>1862 All Other</b> 260017	<b>1890 All Other</b> 0

## V(D). Planned Program (Activity)

### 1. Brief description of the Activity

Experiment station faculty will:

1. Conduct experiments and develop theories that can be used to enhance water efficiencies for agronomic areas and urban areas.

2. Conduct experiments and develop theories that can be used to develop a safer, more reliable supply of water for agricultural and urban consumption.

3. Publish studies related to these two areas of concern.

4. Conduct workshops and meetings to educate the "educators" concerning these issues.

Extension will outreach and partner with agricultural producers and the public to provide educational training, problem solving, and in-depth applied information on:

1. Animal Waste Management

2. Alternative methods of dealing with animal waste such as composting or digestion, especially for those animal owners with small acreages.

3. Partnering to facilitate rehabilitation of degraded watersheds and to enhance the management and water yield of specific watersheds.

4. Protecting and managing watersheds and water resources.

5. Preserve reservoirs, aquifers and other waters.

6. Conserve, manage and enhance efficient water use by agricultural, residential, commercial, and business users.

7. Derive efficient irrigation strategies and technologies.

8. Implement water-wise landscaping practices, including xeriscape use.

9. Initiate landscape water auditing.

10. Evaluate and promote plants that require less water and are drought tolerant.

11. Educate youth and adults on their role in preserving and enhancing water quality.

12. Monitor, identify problem waters, and facilitate improvement of quality through partnering efforts.

13. Enhance quality, capture, and use of storm-water.

14. Facilitate knowledge, methods, and use of gray-water.

15. Demonstrate potential of new technology for improving quality or reclaiming water.

16. Expand the knowledge of soil types and selection of appropriate plants for various types of soils, along with the amount of water available.

17. Identify areas of current or potential soil loss or reduced soil fertility and partner with other agencies to reduce and control these problems.

18. Educate producers on the important interactions of soil and irrigation as well as soil and plant type or variety, especially with respect to soil salinity.

19. Provide information on soil nutrient deficiencies and cost effective soil quality and fertility improvements.

20. Continue demonstration projects — salt levels, soil types, alkalinity, non-traditional soil fertility amendments, fertilizer formulation efficacy, organic matter use and management.

### 2. Brief description of the target audience

The target audience is extension agriculture and horticulture agents, agricultural producers, home and garden owners, small acreage owners, professional landscape managers, the general public, elected officials, federal and state water and soil management agencies.

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

**1. Standard output measures**

2009	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
<b>Plan</b>	24000	36000	4000	4000
<b>Actual</b>	22824	156384	2133	8425

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

**Patent Applications Submitted**

Year: 2009  
 Plan: 0  
 Actual: 1

**Patents listed**

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

**Number of Peer Reviewed Publications**

2009	Extension	Research	Total
<b>Plan</b>	0	25	
<b>Actual</b>	0	21	21

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

**Output Target**

**Output #1**

**Output Measure**

- Number of peer-reviewed journal articles and books extensively peer reviewed.

Year	Target	Actual
2009	25	21

**Output #2**

**Output Measure**

- Number of intermediate publications and presentations (i.e., refereed proceedings).

Year	Target	Actual
2009	25	18

**Output #3**

**Output Measure**

- Level of contract/grant funding

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2009	250000	1300521

**Output #4**

**Output Measure**

- Number of graduate students or post-doctorate's trained

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2009	10	22

**Output #5**

**Output Measure**

- Number of undergraduate students involved in research

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2009	3	6

**Output #6**

**Output Measure**

- Number of theses/dissertations completed

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2009	2	3

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

O. No.	OUTCOME NAME
1	Number of clients (agricultural producers, home owners, small acreage owners and the general; public) increasing their knowledge of soil and/or water conservation.
2	Number of clients (agricultural producers, home owners, small acreage owners and the general public) implementing soil and/or water conservation practices.)
3	Decrease the percent of assessed impaired miles of rivers and streams below a given percentage.
4	Decrease the percent of assessed impaired acres of lakes, ponds, and reservoirs below a certain percentage.

**Outcome #1**

**1. Outcome Measures**

Number of clients (agricultural producers, home owners, small acreage owners and the general; public) increasing their knowledge of soil and/or water conservation.

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

Year	Quantitative Target	Actual
2009	9600	19475

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

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
101	Appraisal of Soil Resources
102	Soil, Plant, Water, Nutrient Relationships
103	Management of Saline and Sodic Soils and Salinity
104	Protect Soil from Harmful Effects of Natural Elements
111	Conservation and Efficient Use of Water
112	Watershed Protection and Management
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
205	Plant Management Systems
213	Weeds Affecting Plants
605	Natural Resource and Environmental Economics

**Outcome #2**

**1. Outcome Measures**

Number of clients (agricultural producers, home owners, small acreage owners and the general public) implementing soil and/or water conservation practices.)

**2. Associated Institution Types**



- 1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

Year	Quantitative Target	Actual
2009	7000	12749

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

**Issue (Who cares and Why)**

The 17 Western states are all associated with severe weather extremes. These states have just completed a 7-year lower-than-normal rainfall so there is always a need to look for ways to conserve water.

**What has been done**

The Slow the Flow program was instituted 5 years ago to assist homeowners in knowing how to organize and maintain their outdoor landscapes to save water. With a grant for over \$89,000.00 from the Central Utah Water Conservancy District, data is compiled from each resident and a summary is made over the past year. USU Extension had over 580 Slow the Flow home visits in 2009 year conducted by 5 Slow the Flow interns.

**Results**

Summary data from participating residents over the past five years shows that residents save 25-28 percent of their water use on their outside landscapes.

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
101	Appraisal of Soil Resources
102	Soil, Plant, Water, Nutrient Relationships
103	Management of Saline and Sodic Soils and Salinity
104	Protect Soil from Harmful Effects of Natural Elements
111	Conservation and Efficient Use of Water
112	Watershed Protection and Management
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
205	Plant Management Systems
213	Weeds Affecting Plants
605	Natural Resource and Environmental Economics

**Outcome #3**

**1. Outcome Measures**

Decrease the percent of assessed impaired miles of rivers and streams below a given percentage.

**2. Associated Institution Types**

- 1862 Extension
- 1862 Research

**3a. Outcome Type:**

Change in Condition Outcome Measure

**3b. Quantitative Outcome**

Year	Quantitative Target	Actual
2009	26	28

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

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
101	Appraisal of Soil Resources
102	Soil, Plant, Water, Nutrient Relationships
103	Management of Saline and Sodic Soils and Salinity
104	Protect Soil from Harmful Effects of Natural Elements
111	Conservation and Efficient Use of Water
112	Watershed Protection and Management
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
205	Plant Management Systems
213	Weeds Affecting Plants
605	Natural Resource and Environmental Economics

**Outcome #4**

**1. Outcome Measures**

Decrease the percent of assessed impaired acres of lakes, ponds, and reservoirs below a certain percentage.

**2. Associated Institution Types**

- 1862 Extension
- 1862 Research

**3a. Outcome Type:**

Change in Condition Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Quantitative Target</b>	<b>Actual</b>
2009	30	32

**3c. Qualitative Outcome or Impact Statement****Issue (Who cares and Why)****What has been done****Results****4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
101	Appraisal of Soil Resources
102	Soil, Plant, Water, Nutrient Relationships
103	Management of Saline and Sodic Soils and Salinity
111	Conservation and Efficient Use of Water
112	Watershed Protection and Management
405	Drainage and Irrigation Systems and Facilities
605	Natural Resource and Environmental Economics

**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**

There have been so many factors that have influenced our ability to follow through on the goals that were set. We have received a 17% reduction in budget from state sources. County-level budgets have also been dramatically impacted. The southern portion of the state experienced a severe drought, a continuation of the past several years. Competing public priorities (primarily social programs and prisons) have further reduced budgets to CES and UAES. The composition of the state's population continues to change, with a higher immigration and in-migration of Individuals outside the goal and program areas established in previous years. This has increased their demand for water and soil conservation. With public and private lands being taken over by invasive species, productivity of those lands are greatly impacted and water and soil interactions have changed substantially, particularly with respect to erosion. These and other factors have combined to reduce the effectiveness of goal attainment, though all goals were achieved to some extent.

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

## 1. Evaluation Studies Planned

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

### **Evaluation Results**

{No Data Entered}

### **Key Items of Evaluation**

{No Data Entered}

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

**Program # 7**

**1. Name of the Planned Program**

Natural Resource Systems and the 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
112	Watershed Protection and Management	22%		10%	
121	Management of Range Resources	23%		5%	
122	Management and Control of Forest and Range Fires	0%		10%	
123	Management and Sustainability of Forest Resources	0%		5%	
124	Urban Forestry	4%		5%	
125	Agroforestry	0%		5%	
132	Weather and Climate	0%		15%	
133	Pollution Prevention and Mitigation	18%		10%	
134	Outdoor Recreation	0%		5%	
135	Aquatic and Terrestrial Wildlife	21%		5%	
136	Conservation of Biological Diversity	10%		5%	
141	Air Resource Protection and Management	0%		5%	
403	Waste Disposal, Recycling, and Reuse	0%		5%	
605	Natural Resource and Environmental Economics	2%		10%	
	<b>Total</b>	100%		100%	

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

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

Year: 2009	Extension		Research	
	1862	1890	1862	1890
Plan	4.0	0.0	6.4	0.0
Actual	4.0	0.0	8.7	0.0

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

Extension		Research	
<b>Smith-Lever 3b &amp; 3c</b> 36299	<b>1890 Extension</b> 0	<b>Hatch</b> 477646	<b>Evans-Allen</b> 0
<b>1862 Matching</b> 42479	<b>1890 Matching</b> 0	<b>1862 Matching</b> 1906934	<b>1890 Matching</b> 0
<b>1862 All Other</b> 0	<b>1890 All Other</b> 0	<b>1862 All Other</b> 680133	<b>1890 All Other</b> 0

## V(D). Planned Program (Activity)

### 1. Brief description of the Activity

Work will be undertaken that attempts to identify principles and practices that maximize the overall benefits from range and forest use/nonuse. Additional research will be undertaken that focuses on air quality—both protection and management of said resource. Finally, economic studies involving environmental issues, primarily management of natural resources, will be continued in order to identify potential economic strategies that will enhance the quality of life and maintain viable environments.

Extension will outreach to livestock producers, general public including youth, private land forest owners, agency personnel, special interest groups and green industry professionals to:

1. Conduct projects consultations, and workshops focusing on the role of outdoor recreation and natural resource-based tourism in relation to community development.
2. Provide information, resources, research, and expertise related to the development of outdoor recreation and natural resources-based tourism opportunities to assist in the diversification of local economies, especially in rural Utah.
3. Partner with others in education and use of resources to rehabilitate the sagebrush steppe environment.
4. Educate and partner to enable the recovery of the sage grouse, pygmy rabbit and others to avoid listing as endangered species.
5. Continue to facilitate and assist the establishment and success of local Conservation Resource Management (CRM) groups, for more local control of decisions on natural resources.
6. Educate the public with respect to the principle causes of air pollution and their role in prevention.
7. Partner with others to enable agriculture producers to meet the requirements of the EPA.
8. Provide training in practical weed inventory and mapping techniques to state and federal land managers.
9. Establish herbicide demonstration/research plots to evaluate the efficacy of these products under local conditions.
10. Determine management options that slows or stops the cycle of cheatgrass and fire on previously burned areas through range rehabilitation, seeding programs and nontraditional approaches to grazing management.
11. Educate producers and agency personnel on the need for continued range evaluation, monitoring, and management improvements and the role of grazing management in sustainable resource management.
12. Educate the public on responsible use and the value of multiple uses on rangelands.
13. Demonstrate the need for controlled logging, thinning and cleaning of some forests to reduce the fire danger and enhance the re-establishment of aspen groves.
14. Illustrate the need for management and control of pinion-juniper forests to restore watershed, wildlife habitat and forage values on rangelands.
15. Educate landowners on how to have timber harvested from their lands in a manner that increases their income while maintaining or enhancing the forest resource.
16. Provide information to landowners and users on grazing management of graze able woodlands.
17. Provide information on how to manage these areas to reduce or control the invasion of harmful insects and invasive weeds from public forests into their private forest lands.
18. Partner with and educate city foresters, green industry professionals, and citizens on health and management trees in urban settings.
19. Partner with and educate livestock producers and agency personnel on the identification and methods of control of the specific noxious and invasive species.
20. Educate developers, home owners, small acreage owners, outdoor recreationists, youth, and others interested in public lands on their critical role in preventing, reporting, and even helping to control these plants.
21. Emphasize the strategic elements of early detection and rapid response as outlined in the most recent National Invasive Species Management Plan.

## 2. Brief description of the target audience

The target audience includes the general public (including youth), users of various environments (agricultural producers, extractive industry representatives, environmentalists, recreationists, green industry professionals, etc.), small acreage owners, private forest owners, federal and state government officials, extension agricultural agents, and other academics and resource managers.

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

#### 1. Standard output measures

2009	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
<b>Plan</b>	10000	182000	10000	13000
<b>Actual</b>	14340	127713	14652	35701

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

##### Patent Applications Submitted

Year: 2009

Plan: 0

Actual: 0

#### Patents listed

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

##### Number of Peer Reviewed Publications

2009	Extension	Research	Total
<b>Plan</b>	0	50	
<b>Actual</b>	0	51	51

### V(F). State Defined Outputs

#### Output Target

##### Output #1

###### Output Measure

- Number of peer-reviewed journal articles and books/chapters in books extensively peer reviewed.

Year	Target	Actual
2009	50	51

##### Output #2

###### Output Measure

- Number of intermediate publications and presentations (e.g., refereed proceedings).  
Not reporting on this Output for this Annual Report

**Output #3**

**Output Measure**

- Level of contract/grant funding.

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2009	75000	1633600

**Output #4**

**Output Measure**

- Number of graduate students or post-doctorate's trained.

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2009	10	36

**Output #5**

**Output Measure**

- Number of undergraduate students involved in research.

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2009	4	6

**Output #6**

**Output Measure**

- Number of theses/dissertations completed.

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2009	4	6



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

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

O. No.	OUTCOME NAME
1	Number of program participants who gain knowledge on natural resource systems and the environment.
2	Number of program participants who implement positive natural resource systems and the environmental practices.

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

Number of program participants who gain knowledge on natural resource systems and the environment.

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

Year	Quantitative Target	Actual
2009	20500	13632

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

Invasive weeds are one of the greatest threats to range resources in the West. One of the largest existing and expanding invasive weed is cheatgrass.

**What has been done**

Recommendations from the latest Utah&#8209;Montana&#8209;Wyoming Weed Management Handbook provide hundreds of Utah land managers with guidance for designing effective control programs against specific invasive weed problems.

**Results**

UAES research indicates that targeted cattle grazing at the appropriate phenological stage in spring can reduce cheatgrass biomass, reduce the density of viable cheatgrass seeds in the seed bank, and reduce the dominance of cheatgrass in the above ground plant community. Thus, cattle, like goats and sheep, have the potential to be used as a biological tool to help break the cheatgrass-fire cycle affecting many degraded (former) sagebrush communities, and help set the stage for re-vegetation treatments to re-establish more diverse and desirable plant communities.

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
112	Watershed Protection and Management
121	Management of Range Resources
122	Management and Control of Forest and Range Fires
123	Management and Sustainability of Forest Resources
125	Agroforestry
134	Outdoor Recreation
135	Aquatic and Terrestrial Wildlife
136	Conservation of Biological Diversity
141	Air Resource Protection and Management
605	Natural Resource and Environmental Economics

**Outcome #2**

**1. Outcome Measures**

Number of program participants who implement positive natural resource systems and the environmental practices.

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

Year	Quantitative Target	Actual
2009	3600	9040

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

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
112	Watershed Protection and Management
121	Management of Range Resources
122	Management and Control of Forest and Range Fires
123	Management and Sustainability of Forest Resources
125	Agroforestry
134	Outdoor Recreation
135	Aquatic and Terrestrial Wildlife
136	Conservation of Biological Diversity
141	Air Resource Protection and Management
605	Natural Resource and Environmental Economics

## **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**

There have been so many factors that have influenced our ability to follow through on the goals that were set. We have received a 17% reduction in budget from state sources. County-level budgets have also been dramatically impacted. The southern portion of the state experienced a severe drought, a continuation of the past several years. Competing public priorities (primarily social programs and prisons) have further reduced budgets to CES and UAES. With public and private lands being taken over by invasive species, productivity of those lands are greatly impacted. Additional public regulation, particularly with land use issues and air quality, has had a major impact on the natural resource system. These and other factors have combined to reduce the effectiveness of goal attainment, though all goals were achieved to some extent.

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

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

- After Only (post program)
- Retrospective (post program)
- Before-After (before and after program)
- During (during program)
- Time series (multiple points before and after program)
- Case Study
- Comparisons between program participants (individuals, group, organizations) and non-participants
- Comparison between locales where the program operates and sites without program intervention

### **Evaluation Results**

{No Data Entered}

### **Key Items of Evaluation**

{No Data Entered}

**V(A). Planned Program (Summary)****Program # 8****1. Name of the Planned Program**

Production, Marketing, Trade, and International Economics

**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	5%		10%	
602	Business Management, Finance, and Taxation	9%		5%	
603	Market Economics	0%		15%	
604	Marketing and Distribution Practices	7%		20%	
605	Natural Resource and Environmental Economics	0%		10%	
606	International Trade and Development	0%		5%	
607	Consumer Economics	0%		5%	
608	Community Resource Planning and Development	79%		15%	
609	Economic Theory and Methods	0%		5%	
610	Domestic Policy Analysis	0%		5%	
611	Foreign Policy and Programs	0%		5%	
	<b>Total</b>	100%		100%	

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

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

Year: 2009	Extension		Research	
	1862	1890	1862	1890
Plan	6.0	0.0	1.4	0.0
Actual	4.0	0.0	1.4	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
36299	0	140555	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
42479	0	45370	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	649022	0

**V(D). Planned Program (Activity)**

**1. Brief description of the Activity**

Under the auspices of the experiment station, market tests will be conducted in order to determine the price premium associated with alternative production and marketing programs. Models will be built to quantify the impacts associated with international trade. Work will continue in the area of risk reduction for agricultural producers. Research and extension efforts will be needed to more thoroughly analyze the impacts of alternative, risk reducing strategies. Finally, firm-level analyses will continue so as to identify specific changes that might be made on individual farms and ranches that would enhance net returns.

More specifically, extension will outreach to agriculture businesses, small manufacturers, and entrepreneurs to provide educational training and in-depth information on:

- Small business management
- Home-based businesses
- Main street community programs
- Business retention and expansion
- Rural and heritage tourism
- Rural and economic development activities.
- E-commerce programs
- Community entrepreneurship programs
- Marketing (Market feasibility, research, customer relations/service, pricing)
- Finances (recordkeeping, raising capital, growing/expanding financial issues)
- Business plans for potential business owners
- Patents/trademarks/copyrights
- Insurance, zoning, and legal requirements
- Identifying business opportunities
- Developing a youth entrepreneurship program

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

The target audience for this planned program will include Utah communities, business owners, manufacturers, entrepreneurs, agricultural producers, agribusiness firms, state agencies, local governments, small acreage producers, policy makers, and the general public (including youth).

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

**1. Standard output measures**

<b>2009</b>	<b>Direct Contacts Adults</b>	<b>Indirect Contacts Adults</b>	<b>Direct Contacts Youth</b>	<b>Indirect Contacts Youth</b>
<b>Plan</b>	15000	22000	500	700
<b>Actual</b>	9244	141768	1021	6850

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

**Patent Applications Submitted**

Year: 2009  
 Plan: 0  
 Actual: 0

**Patents listed**

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

**Number of Peer Reviewed Publications**

<b>2009</b>	<b>Extension</b>	<b>Research</b>	<b>Total</b>
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<b>Plan</b>	0	5	
<b>Actual</b>	0	7	7

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

**Output Target**

**Output #1**

**Output Measure**

- Number of peer-reviewed journal articles and books/chapters in books extensively peer reviewed.

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2009	5	3

**Output #2**

**Output Measure**

- Level of contract/grant funding.

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2009	25000	671707

**Output #3**

**Output Measure**

- Number of intermediate publications and presentations (i.e., refereed proceedings).  
Not reporting on this Output for this Annual Report

**Output #4**

**Output Measure**

- Number of graduate students trained.

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2009	3	5

**Output #5**

**Output Measure**

- Number of undergraduate students involved in research.

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2009	5	3

**Output #6**

**Output Measure**

- Number of theses/dissertations completed.

<b>Year</b>	<b>Target</b>	<b>Actual</b>
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2009

3

2



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

O. No.	OUTCOME NAME
1	Number of clients who increase their knowledge of marketing trade, and economic development.
2	Number of clients who implement positive marketing, trade, and economic development practices.
3	A percentage (%) 12 month increase in manufacturing employment in Utah.

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

Number of clients who increase their knowledge of marketing trade, and economic development.

**2. Associated Institution Types**

- 1862 Extension
- 1862 Research

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

Year	Quantitative Target	Actual
2009	7300	6227

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

Agriculture and the beef cattle industry in North America and the world have undergone significant changes, particularly over the last few years. These changes are a result of US domestic policy relative to the use of ethanol as an energy source. These changes may extend for many years to come and affect all aspects of beef cattle production.

**What has been done**

UCES has been involved in studies and activities on enhancing the competitiveness of U.S. Red Meats; the emergence of supply chains and their potential impact on Utah's food and agriculture; cattle marketing and ranch management; crop marketing; and wholesaling and retailing non-traditional agriculture products in Utah. Through these studies cattle producers in Utah and surrounding states are kept abreast of changing market conditions. This year the impact of ethanol on feed prices and the resulting implications for the livestock industries was a major educational focus.

**Results**

Before and after tests at the Beehive Master Beef Manager Program showed that producers' knowledge was increased. Some producers make management and marketing decisions based on information from the USU Extension website, which in turn, is based on research based data analysis activities. Bankers and farmers have gained a better understanding of the current market forces impacting prices and returns to various crops.

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
601	Economics of Agricultural Production and Farm Management
602	Business Management, Finance, and Taxation
603	Market Economics
604	Marketing and Distribution Practices
605	Natural Resource and Environmental Economics
606	International Trade and Development
607	Consumer Economics

- 608 Community Resource Planning and Development
- 609 Economic Theory and Methods
- 611 Foreign Policy and Programs

**Outcome #2**

**1. Outcome Measures**

Number of clients who implement positive marketing, trade, and economic development practices.

**2. Associated Institution Types**

- 1862 Extension
- 1862 Research

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

Year	Quantitative Target	Actual
2009	2500	2329

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

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
601	Economics of Agricultural Production and Farm Management
602	Business Management, Finance, and Taxation
603	Market Economics
604	Marketing and Distribution Practices
605	Natural Resource and Environmental Economics
606	International Trade and Development
607	Consumer Economics
608	Community Resource Planning and Development
609	Economic Theory and Methods
611	Foreign Policy and Programs

### **Outcome #3**

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

A percentage (%) 12 month increase in manufacturing employment in Utah.

Not Reporting on this Outcome Measure

#### **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**

There have been so many factors that have influenced our ability to follow through on the goals that were set. We have received a 17% reduction in budget from state sources. County-level budgets have also been dramatically impacted. Competing public priorities (primarily social programs and prisons) have further reduced budgets to CES and UAES. The composition of the state's population continues to change, with a higher immigration and in-migration of individuals outside the goal and program areas established in previous years. Economic issues are the single most important issues facing the states' agricultural complex and a fall in producer earnings is a large part of that picture. These and other factors have combined to reduce the effectiveness of goal attainment, though all goals were achieved to some extent.

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

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

- Before-After (before and after program)
- During (during program)
- Time series (multiple points before and after program)
- Case Study
- 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.
- Comparison between locales where the program operates and sites without program intervention

##### **Evaluation Results**

{No Data Entered}

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

{No Data Entered}

**V(A). Planned Program (Summary)****Program # 9****1. Name of the Planned Program**

Individuals, Families, and Communities

**V(B). Program Knowledge Area(s)****1. Program Knowledge Areas and Percentage**

<b>KA Code</b>	<b>Knowledge Area</b>	<b>%1862 Extension</b>	<b>%1890 Extension</b>	<b>%1862 Research</b>	<b>%1890 Research</b>
701	Nutrient Composition of Food	0%		10%	
702	Requirements and Function of Nutrients and Other Food Components	0%		5%	
703	Nutrition Education and Behavior	34%		10%	
704	Nutrition and Hunger in the Population	0%		5%	
721	Insects and Other Pests Affecting Humans	0%		5%	
723	Hazards to Human Health and Safety	1%		5%	
724	Healthy Lifestyle	2%		10%	
801	Individual and Family Resource Management	45%		10%	
802	Human Development and Family Well-Being	10%		15%	
803	Sociological and Technological Change Affecting Individuals, Families, and Communities	7%		10%	
804	Human Environmental Issues Concerning Apparel, Textiles, and Residential and Commercial Structures	0%		5%	
805	Community Institutions, Health, and Social Services	0%		10%	
806	Youth Development	1%		0%	
	<b>Total</b>	100%		100%	

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

<b>Year: 2009</b>	<b>Extension</b>		<b>Research</b>	
	<b>1862</b>	<b>1890</b>	<b>1862</b>	<b>1890</b>
Plan	44.0	0.0	1.6	0.0
Actual	69.0	0.0	1.4	0.0

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

Extension		Research	
<b>Smith-Lever 3b &amp; 3c</b> 626166	<b>1890 Extension</b> 0	<b>Hatch</b> 12357	<b>Evans-Allen</b> 0
<b>1862 Matching</b> 732766	<b>1890 Matching</b> 0	<b>1862 Matching</b> 858629	<b>1890 Matching</b> 0
<b>1862 All Other</b> 0	<b>1890 All Other</b> 0	<b>1862 All Other</b> 148435	<b>1890 All Other</b> 0

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

The faculty affiliated with the experiment station will:

1. Conduct research with respect to human nutrition, family finances, bankruptcy, and community development.
2. Publish studies and make presentations related to individuals, family finances, and community well-being.

Specialists and agents will conduct workshops and meetings, deliver activities, develop new curricula, write newsletters and news releases and post Internet fact sheets. They will provide training in a variety of mediums—face-to-face, satellite, group discussions, demonstrations, conferences and workshops, via DVDs, CDs, fact sheets, newsletters, and other media.

Individual and family financial activities will include: Take Charge of Your Money, Power Pay and Power Saves, Utah Saves Education and Outreach, Individual Development Account, First Time Homebuyer Assistance, Financial Education for Bankruptcy Filers (USU is certified by the Department of Justice to offer debtor education classes), Living Well on Less, Money Sense for Your Children, and Earned Income Credit assistance.

Teaching methods of The Utah Food Stamp Nutrition Education include individual, group classes, DVD video series, and an on-line course. FSNE Nutrition Education Assistants will provide other nutrition education opportunities to FSNE participants via demonstrations, newsletters, fact sheets, etc. as determined by Food Stamp Eligible needs in each county. Additionally, printed materials and educational displays will be available at local employment centers and other places where low-income people gather. Several counties will continue conducting cooking schools in cooperation with the local employment center; some will continue distribution of newsletters to participants.

The Nutrition Education Assistants will use the "Give Your Body the Best" curriculum developed in 2005 by USU to teach individuals or groups of low income persons. They will also teach lessons on chronic diseases; on food allergies, intolerance, and poisoning; and lessons on getting to know foods and enjoy them.

Community development specialists and extension personnel who are knowledgeable in community assessment will increase the capacity among other extension personnel to participate in or lead community self-assessments that lay the groundwork for subsequent project activities. These assessments come in various forms (SWOT analyses, asset mapping, search conferencing, surveys, etc.) and typically participatory, drawing upon the values and knowledge of local residents. They will also develop capacity in extension personnel to conduct activities identified as priorities through the community self-assessments.

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

The target group is the general population of Utah (including youth), with a special emphasis on Native Americans, Latinos, African Americans, Asians/Pacific Islanders, and low income families with children at or below poverty levels, food stamp program eligible individuals, and individuals facing bankruptcy. A subgroup of the audience targets is pregnant teens and teen mothers.

Elected officials, appointed officials, general population (including youth), and at-large community opinion leaders and influential people are targeted for community development.

**V(E). Planned Program (Outputs)****1. Standard output measures**

2009	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
<b>Plan</b>	150000	303000	433000	515000
<b>Actual</b>	161734	803583	434419	860470

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

**Patent Applications Submitted**

Year: 2009  
 Plan: 0  
 Actual: 0

**Patents listed**

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

**Number of Peer Reviewed Publications**

2009	Extension	Research	Total
<b>Plan</b>	0	15	
<b>Actual</b>	0	16	16

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

**Output Target**

**Output #1**

**Output Measure**

- Number of peer-reviewed journal articles and books extensively peer reviewed.

Year	Target	Actual
2009	15	16

**Output #2**

**Output Measure**

- Number of intermediate publications and presentations (i.e., refereed proceedings).

Year	Target	Actual
2009	15	16

**Output #3**

**Output Measure**

- Level of contract/grant funding.

Year	Target	Actual
2009	25000	577750

**Output #4**

**Output Measure**

- Number of graduate students trained.

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2009	4	4

**Output #5**

**Output Measure**

- Number of undergraduate students involved in research.

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2009	3	4

**Output #6**

**Output Measure**

- Number of theses/dissertations completed.

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2009	2	3



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

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

O. No.	OUTCOME NAME
1	Number of clientele who gain knowledge about healthy and financially secure individuals, families, or communities.
2	Number of clientele who implement practices for healthy and financially secure individuals, families, or communities.
3	Percentage of Adults Who Reported Seven or More Days Physical Health NOT Good in the Past 30 Days.

**Outcome #1**

**1. Outcome Measures**

Number of clientele who gain knowledge about healthy and financially secure individuals, families, or communities.

**2. Associated Institution Types**

- 1862 Extension
- 1862 Research

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

Year	Quantitative Target	Actual
2009	228000	105358

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

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
701	Nutrient Composition of Food
702	Requirements and Function of Nutrients and Other Food Components
703	Nutrition Education and Behavior
704	Nutrition and Hunger in the Population
801	Individual and Family Resource Management
802	Human Development and Family Well-Being
803	Sociological and Technological Change Affecting Individuals, Families, and Communities
806	Youth Development

**Outcome #2**

**1. Outcome Measures**

Number of clientele who implement practices for healthy and financially secure individuals, families, or communities.

**2. Associated Institution Types**

- 1862 Extension
- 1862 Research

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

Year	Quantitative Target	Actual
2009	131000	47723

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

**Issue (Who cares and Why)**

By many measures, the challenges of financial insecurity in the United States have reached alarming proportions. The historically and comparatively low saving rate, record levels of household debt, and half of all households nearing retirement with less than \$10,000 in a 401(K) type plan or an IRA, are all signals that as a nation we are not as financially secure as we should be.

**What has been done**

Utah Saves is Utah's campaign in the national effort to reduce debt and increase savings. Along with United Ways of Utah and AAA Fair Credit Foundation, USU Extension is a founding partner in Utah Saves. There are currently 90 other Utah Saves partners. Family and Consumer Science (FCS) Agents and educators are trained in finance education. Utah Saves is incorporated into finance education classes taught in eleven Utah counties.

**Results**

Between 2004 and 2009 there were 8,592 savers participating in the program who are saving over a million dollars per month. Most participants are saving for an emergency fund or debt repayment. Utah Saves, with the exception of Military Saves, is the most successful Saves Campaign in the nation (source: The Consumer Federation of America).

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
701	Nutrient Composition of Food
702	Requirements and Function of Nutrients and Other Food Components
703	Nutrition Education and Behavior
704	Nutrition and Hunger in the Population
801	Individual and Family Resource Management
802	Human Development and Family Well-Being
803	Sociological and Technological Change Affecting Individuals, Families, and Communities
806	Youth Development

**Outcome #3**

**1. Outcome Measures**

Percentage of Adults Who Reported Seven or More Days Physical Health NOT Good in the Past 30 Days.

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Condition Outcome Measure

**3b. Quantitative Outcome**

Year	Quantitative Target	Actual
2009	16	14

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

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
701	Nutrient Composition of Food
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806	Youth Development

## 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

There have been so many factors that have influenced our ability to follow through on the goals that were set. We have received a 17% reduction in budget from state sources. County-level budgets have also been dramatically impacted. The southern portion of the state experienced a severe drought, a continuation of the past several years. Competing public priorities (primarily social programs and prisons) have further reduced budgets to CES and UAES. The composition of the state's population continues to change, with a higher immigration and in-migration of Individuals outside the goal and program areas established in previous years. Family issues are of increasing importance. Health issues are a significant problem. These and other factors have combined to reduce the effectiveness of goal attainment, though all goals were achieved to some extent.

## 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)
- Case Study
- 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.
- Comparison between locales where the program operates and sites without program intervention

### Evaluation Results

{No Data Entered}

### Key Items of Evaluation

{No Data Entered}