2007 Utah State University Combined Research and Extension Annual Report

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I. Report Overview

1. Executive Summary

Land Use and Sustainable Communities

The Utah Agricultural Experiment Station (UAES) and Utah Cooperative Extension Service (UCES) have been involved with an evaluation of the socio-economic impact of land policies affecting public and private lands in the western United States. Various market failures explain why lands were retained by the federal government. These failures also suggest why the management of these lands remains contentious. These controversies center around three basic issues: 1) who has access to federal lands, 2) what can people do that have access and 3) who obtains the rents associated with the use of these lands. There has been a long standing problem in the West, which is expected to continue until there is a long-term resolution of the property rights associated with both public and private land and land-based resources.

Extension is also involved in a trial to see how well Switch Grass will grow in Beaver County to use it to produce ethanol, partly funded through the UAES. Other issues involving UCES and Experiment Station work include issues of open space (greenbelt), Ag/urban interface, invasive weeds, zoning issues, animal husbandry, public land use, and general resource management.

Many of the rural Utah population moved for the open space and “small town” feel, but they also want big city amenities. These contradictory thoughts cause many emotional discussions with little substance or real understanding of the issue. Research conducted by the UAES suggests that conflicts are often introduced by new rural residents who do not always realize the impact they have on local communities (i.e., medical, public schools, etc.) The results of other research show that new residents who spend at least 10 years in the local community are less likely to move out of an area. This holds true for all nationalities except Latinos.

Other time related issues such as Africanized Honey Bees (killer bees), various diseases, and insects arise from misunderstanding and hype. It is essential to address both the gap and misunderstanding to adult and youth in educational forms, presentations, and literature. Acting as the facilitator and educator in these areas is a great role for UCES. There is greater public awareness of producers, green space, and the benefits of farming in the local culture and increased appreciation for our wild lands and the acceptance of sustainable yield. Research data supporting these educational efforts were provided in part by the UAES.

UCES participated in the 4th Annual Utah Tourism Conference. Conference attendees increased their awareness of IORT and were informed of its mission and program functions. Workshop/panel presentation attendees increased their awareness and knowledge of the importance of tourism research and implications for public policy, and the role of public lands in promoting nature and the natural to visitors.

Small Acreage Workshops are also held by USU to help small land owners learn how to get benefit from their small acreages. Twenty-seven small acreage owners attended the small acreage workshop. The evaluations were positive. These workshops were based on data generated by UAES scientists.

UCES is involved in the Carbon Economic Development Council, helping business get established, diversifying the local economic base, and providing improvement information to existing businesses. The Council, in cooperation with Emery County, provides an economic summit each year. Several hundred people attended the economic summit and received instruction in agricultural, manufacturing, retail, and other business topics.

Work done by UCES helped the Greenwich Water Company receive an $110,000 grant and an $110,000 no interest loan for a new storage tank. A previous Upper Sevier River Board grant for the project was $100,000. Residents of Greenwich, Utah will not be paying interest on $220,000 but will be paying back only $110,000 to the state of Utah without any interest charges. With other funding available through PSSD the $110,000 loan will be paid off without costing the community.

The UCES Business, Entrepreneurship and Rural Economic Development Programs help Utah communities, business and individuals to make choices and decisions regarding growth, employment and development alternatives. UCES provides assistance to communities and businesses to help them evaluate the advantages and disadvantages of development strategies such as entrepreneurship, business retention and expansion, business recruitment and new business start-ups. Overall, 1783 participants statewide received training or counseling as a result of UCES activities. The entrepreneurship and business development Initiative pilot county staff trained and certified in NxLevel, EDGE Community Entrepreneurship, StartSmart, Home Based Business, and E-Commerce and they planned, organized, and facilitated county wide economic development conferences for five counties. Thirty-six clients were assisted in securing loans totaling $6.2 million dollar.

UCES was involved in developing a training curriculum on Effective Professional and Interpersonal Communication in 2007. It is intended to promote the development of leadership skills in citizens from communities across the state. The four-module training has been developed to enhance the participant's skill in understanding their own communication and conflict management

behaviors, and provide them with constructive strategies for improving them. As part of the development of the EPIC program, a 2-day County Director training was offered in November, 2007. It had the dual purpose of serving as an in-service training for them and also to expose them to the EPIC curriculum so that they might consider offering it in their counties. UCES is increasingly asked to design and/or facilitate potentially contentious processes.

The Manufacturing Extension Program has had a very successful year in working with Utah's manufacturing community. The MEP is ranked as one of the top 5 MEP Centers nationally for Economic Impact on Manufacturers. The following are Impacts for 2007: Number of Companies reporting Impacts = 65, Total Bottom-line Impact = $47,911,450, Total Investment Impact = $ 34,173,974. Customer Satisfaction Score = 4.69/5.00 Jobs Created or Retained = 420.

Sustainable Plant Communities

The Sustainable Plant Communities programs can be summarized in several main areas. Nested within these areas, activities such as publications, workshops, meetings, utilization of media, and field days can be found. UCES and the Experiment Station enjoy a good reputation in Utah and have access to a wide range of media for dissemination of current research-based recommendations and educational programs.

In Tooele County, approximately forty small acreage owners from Tooele County and the surrounding region attended UCES led workshops. In 2007, as part of the weed control program, 1,800 acres have been treated, 19,000 have been monitored, and over 100 landowners participated. These alfalfa producers have been successful in controlling weeds and pests in their fields.

One hundred and fifty producers learned improved production and marketing practices at the Hay Symposium where presentations were made by UCES and Experiment Station faculty and staff. By following the practices taught one farm owner increases profits on 130 acres of corn by $21,000. Another farmer learned to manage his irrigation system more efficiently and increased hay yield by 30%. Producers increased profits by $47,200 by following USU soil fertility recommendations.

Weed control in Utah is a serious concern because of its impact on productivity of wild lands, the propensity for cheatgrass to result in wildfires, and the reduction of agricultural yields. The control of weeds remains a great challenge and determination of sustainable methods of control is a top priority, especially in wild land areas where economic inputs are limited. UAES research is ongoing in this critical area though progress is often slow and much remains to be done. A highlight of the weed management program is the collaboration of UCES and UAES personnel in Cooperative Weed Management Area programs. The CWMA's are designed to bring UCES, federal land managers, private property owners, agencies such as APHIS, and county weed supervisors together to work on noxious weed problems within a defined geographical area. Seven counties (Juab, Summit, Sevier, Grand, Uintah, San Juan, and Emery) have participated in CWMA's working to control noxious weeds such as salt cedar, square rose knapweed, cheatgrass and others. Other major programs have included efforts to educate the public so they have an awareness of the impact of weeds, weed identification and mapping, and significant publications such as Weeds of the West.

The Master Gardener program continues to make a major contribution in the education of homeowners regarding sustainable methods of landscape and garden management. The Master Gardener program is very successful in directly educating the public, and indirectly through the efforts of volunteers. Management of the program state-wide has been facilitated through the development of a Master Gardener coordinator charged with bringing uniformity and coordination to the program. UAES research data are the basis for many of these articles, books, and UCES-type outlets.

Since many of the plant communities in the west are dependent upon irrigation, sustainable irrigation practices in the form of water conservation through efficient water use are essential to the sustainability of the plant communities themselves. Research and UCES programs conducted during the past year include improved management of irrigation to reduce the number of applications per year, determination of optimum irrigation for commercial fruit production, demonstrations of water conserving crops (safflower) and landscape plants, improved irrigation water measurement techniques, and Water Check landscape water conservation programs in several counties in northern Utah. Conservation programs are having an impact and increasing awareness of the public. The use of drought tolerant plants and irrigation conservation techniques will increase water use efficiency and move irrigated crops and landscapes to a more sustainable level. Research programs examining the use of native plants have resulted in four demonstrations gardens, development of the WDC-011 working group, an aerial survey for selection of landscape plants, propagation of plants by Master Gardeners for use at the Utah Botanical Center, and continued cooperation with the green industry.

Enhanced sustainability of commercial crop production has been aided through UCES and UAES programs encouraging crop diversity, testing of new fruit and vegetable cultivars for use in Utah, and adoption of high tunnel production techniques for enhanced profitability. In addition, there are programs supporting small acreage production with organic or traditional practices that are designed to support small growers in the urban areas of the state. The Central Utah Biodiesel program and the Freeways to Fuel programs have resulted in increased public awareness, variety trials, and planning of entrepreneurial activities.

Integrated Pest Management (IPM) encompasses all practices which enable plant production while minimizing the cost and economic impact of pest control (the essence of sustainability). Programs implemented included demonstration of IPM technologies in commercial orchards, use of codling moth mating disruption, trapping and using baits to control western cherry fruit fly, new pesticide for wooly apple aphid suppression, improved IPM techniques for onion thrips control, variety selection for Iris

Yellow Spot Virus resistance in onions, and comparison of various bactericides for fire blight control. These practices have resulted in direct support of the commercial fruit, vegetable, ornamental and agronomic crops, in addition to supporting home owners and landscape managers throughout the state. IPM programs for homeowners have included trapping of Japanese beetles in an eradication program. County agents and specialists are also heavily involved in collaborating with the Utah Department of Ag and Food in presenting pesticide applicator workshops for certification of applicators. This training insures that applicators are aware of alternative pest management options and the proper use of pesticides when needed.

A key tool in all IPM programs is plant diagnosis. Currently, several counties have local diagnostic clinics enabling home owners and professionals to bring samples in for diagnosis. Twelve counties are also linked to the Utah Plant Pest Diagnostic Laboratory located on the campus at Utah State University through a system of digital imaging microscopes. The cameras allow agents or master gardeners to take pictures of disease symptoms or insects they are unfamiliar with and send them to campus for either diagnosis or verification. The system has reduced response time and has been the key to the quick identification of serious problems such as the Utah County Japanese beetle infestation. 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. First Detector training has been given to 26 individuals to provide updates on agroterrorism threats and appropriate responses.

Monitoring of pest populations is a critical part of the IPM program. Using trapping and modeling of pests, coupled with an effective notification program, has allowed growers to time pest control procedures to optimize their efficacy and minimize excess pesticide application.

UCES and the UAES have participated in the High Value Specialty Crop Pest Management program which allows minor use registration of pesticides for the $98 million minor crop industry in Utah.

Alfalfa seed production in Utah is beginning to increase. We have been testing a tank mixture of hexazinone and diuron for season-long weed control in alfalfa. It is expected that with the combined 2006 and 2007 data Utah will be able to seek a state label (24C) from EPA for the use of AlfaMax Gold on alfalfa grown for seed. The acreage of seed alfalfa in Utah is growing and appears to be increasing each year.

Research conducted through the UAES is underway on acceptable fruit rootstocks for Utah, primarily apples. Studies on plant production in controlled environmental systems have provided much needed data for the U.S. Space program. Extensive research has been undertaken in attempt to control plant pests with their associated damages. Plant breeding programs are underway to enhance feed and food grains.

Sustained Livestock Production

UCES and UAES are involved in a wide array of studies and programs related to animal management systems. Producers report that research-based information provided by UCES will help 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 UCES programs are spending more time looking at their operations and finding ways to cut costs and improve production.

Through the success of the Sheep and Goat Education Day, UCES is gaining greater respect from the sheep producers of the state. On post-workshop evaluations 95% of participants stated they had been provided with new information. Eighty percent of participants indicated the information gained would benefit them economically.

Master Beef Manager classes were held by UCES. 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. Results from the Master Beef Managers Program pre- & post-workshop self-assessed understanding has shown that for a majority of workshop topics statistically significant learning has taken place ($p<.05$). Eighty-nine percent from a mail survey report they are better able to identify and manage those risk factors taught during the management workshops at their location. Fifty-six percent say they feel better able to make risk/benefit assessments when looking at changes in management or when adopting new strategies after participating in the Right Risk computer simulations. Ninety-four percent report they examine decisions more closely relative to risk than before participating in the Master Beef Manager program and 56% state that their educational priorities changed as a result of participation in the Master Beef program.

Horse Clinics were hosted across the state by UCES with approximately 250 people attending. These clinics included Nutrition, Training through Your Horse's Eyes, Horse Show Judges' Certification and First Aid for Your Horse. People attending these clinics gained skills in proper nutrition of their horses. Individual feed programs were analyzed and feeding programs changed to make programs better for horse and more economical for owner. The training clinics gave people insight into ground handling and under saddle work. Safety issues for horse and handler are covered along with proper tack and equipment. From the First Aid Clinics people gained very practical skills in understanding wound care, colic evaluation, and vital signs. Participants gained hands-on skills in leg wrapping, vital signs evaluation and emergency hoof care on the trail. Within the adult equine education program over 95% of respondents to all of the surveys indicated value to them from attending. Over 50% of all who attended indicated changes to be made in their equine management processes.

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 UCES's range and pasture information was extremely valuable.

UCES 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.

After the Milford Flat fire of 2007, the federal agencies set up a range reseeding program. Perennial forage kochia was not part of the seed mix. Lobbying by producers altered this plan and perennial forage kochia is now included. UCES played a key role in getting pertinent information to the producers and they in turn lobbied for this change. USU coordinated the distribution of free hay from farmers in the northern part of the state to the farmers who were affected by the fire. A number of banks paid to have the hay hauled down. Over 460 tons of hay was given. With the high hay prices and the cost of hauling the hay this contribution is worth over $92,000. The range trial research USU is conducting will give information for ranchers and the BLM to use when replanting a lot of this area and will be useful information to have for years to come.

UCES has conducted the 10th Intermountain Beef 3910 Workshop. The objective of the course is to teach research-based principles of Beef Quality Assurance (BQA), live animal and carcass evaluation, the grading system and demonstrate new technology (ultrasound and best animal handling procedures). Significant learning occurred in eleven of fifteen subject matter areas relating to various segments of the beef production industry ($p<.05$), as measured by pre- and post-workshop evaluations. Additional synergistic learning and networking occurred within working groups during the workshop as producers, students and packing industry personnel worked together on various learning modules. Written evaluations for the course have all been in the outstanding to above average category. Producers are better able to provide a product suited for the wholesale and retail trade after taking this workshop.

BQA continues to be one of UCES's major beef programs 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 the 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. These efforts will most certainly require long-term investments in research and outreach.

In 2007, 7,993 cases were accessed at the Utah Veterinarian Diagnostic Lab, which required 110,413 individual assays. 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.

The enhanced ability to test poultry flocks in a timely way and focus on the producers' needs have greatly increased the number of poultry accessions submitted to the Central Utah Branch. By USU being available to help producers on a one-on-one basis (including field visits), the commercial poultry producers of the State have increased the number of submitted specimens for necropsy, surveillance, and disease monitoring. No sera were submitted for enzyme-linked immunosorbent assays (ELISA) testing for vaccination monitoring before April 2007. The number of commercial poultry accessions for necropsy has increased since 2006, and environmental bacterial surveillance samples have increased and are still on the rise.

Plant, Animal and Microbial Genomics

Gene duplication is a primary source of new genes that have arisen through evolution. The purpose of this study is to investigate how new gene functions arise after gene duplications.

Because our proposed research is so basic in nature, we have made relatively minor contributions to the knowledge of the consequences of gene duplication. Nevertheless, these studies are essential for long-term fundamental improvements in our knowledge of gene duplication events. Long-term collaborations are being built with the USDA, ARS, Forage and Range Research Lab. These groups investigate locally important rangeland grasses and plants that have also undergone whole genome duplications and are directly related to the proposed research.

Gastrointestinal nematode parasitism is arguably the most serious constraint affecting ruminant production world-wide. 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.

Relatively few genes controlling traits in livestock species are known. Knowledge of the genetic region containing important genes will lead towards the genetic selection of animals with favorable combinations or manipulation of these genes to enhance animal performance. The intended direction of this continuing research project is to enhance the identification of genes that significantly affect traits of economical importance in livestock species. Animal geneticists have been searching for the molecular basis of production traits in sheep, including fertility, reproduction, growth rate and efficiency, milk production, carcass quality and

composition, wool characteristics, and disease resistance. The development of an ovine genome map containing molecular markers and genes has greatly advanced the identification of genetic regions influencing and controlling these traits. Other genomic resources available for researchers include an ovine radiation hybrid panel, large-insert genomic libraries, large-scale sequencing projects, low- and high-density SNP chips, and most recently, the virtual sheep genome, a whole-genome physical map orientated against the human, dog and cow genome assemblies.

Many researchers are establishing projects to identify economic trait loci (ETL) in livestock, including sheep. The development of genomic resources for sheep will greatly enhance the identification of genetic regions influencing economically important traits. The International Sheep Genome Consortium (ISGC) is composed of scientists, commodity organizations and funding agencies from Australia, France, Kenya, New Zealand, United Kingdom and United States, including the NAGRP Sheep Genome Coordinator. The ISGC emphasizes the development of public genome resources that contribute to the sheep genome map and ultimately lead to a completely sequenced ovine genome.

Radiation hybrid mapping is a method for producing high resolution genome maps, which can then be used for determining gene order. By mapping expressed sequence tags (ESTs) that are common across species, a radiation hybrid panel can also serve as the comparative link across species. In this way, knowledge of the genome organization of a species is enhanced as well as integrated with other species maps. Within this project, an ovine whole-genome radiation hybrid (RH) panel of 5,000 rad will be constructed and used for the development of an ovine framework/comparative map. This map will contain about 500 microsatellite markers previously assigned to ovine and bovine linkage maps and about 500 ovine ESTs with known human map locations. The resulting comparative map of the ovine genome can be orientated with respect to the expression maps of humans, mice and cattle, thereby facilitating identification of genes controlling important traits in sheep. In addition, gene order of sheep can be compared to that of cattle and humans, providing boundaries of conserved gene order among these species and contributing to the study of chromosomal evolution. We have constructed the USUoRH5000 ovine radiation hybrid (RH) panel that is now being used for development of framework/comprehensive RH maps for sheep. This panel is being distributed to researchers who will contribute their data to the ovine RH and linkage maps. Radiation hybrid maps have been constructed for sheep chromosomes 2, 6, 23, and 26, for a total of 580 loci, as well as regions on chromosomes 8, 9 and 20 that are homologous to human chromosome 6.

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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. Currently, there is no genome-wide physical map for sheep. A genome-wide physical map serves many functions in genome research, and will facilitate efficient positional cloning of trait genes, provide mapping of high-throughput ESTs, allow development of targeted SNPs and microsatellite markers, and create an essential foundation for whole-genome sequencing. We demonstrate that limited sequencing of sheep BAC clones combined with positioning on the well assembled human genome such as humans can yield extensive, detailed subgene-level maps useful for isolation of genes and genetic markers in sheep.

Modern commercial turkeys are the most susceptible animals to the toxic effects of the mycotoxin aflatoxin B1 (AFB1). Even levels of feed-borne AFB1 contamination within the legal limit cause measurable adverse health effects in turkeys. Our previous research leads us to believe that AFB1 hypersensitivity in turkeys is dictated by two genes that have been inadvertently selected against through years of intensive breeding for traits such as meat quality and quantity. We will use a genomic approach to identify markers of these genes that relate to AFB1 resistance in wild turkeys and other strains from which modern commercial turkeys are descended. The long-term goal of this project is to restore protective traits in commercial turkeys by selective breeding. Increasing resistance in poultry to aflatoxicosis will help the industry through improvements in animal health, increases in productivity, and by providing a safer product for consumers.

Bluetongue virus is a worldwide disease in domestic animal and wild ruminant and recently being considered as a bio-terrorist agent. DNA vaccine and the use of BTV NS-2 protein against this disease are being developed. This will contribute significantly to identify biologically active agents that can be used against BTV that bio-terrorists might use against US. NS-2 protein can also be used to develop two kits that can make definitive diagnosis of BTV-infected or vaccinated animals and specific isolation of all ss-RNAs for genomic investigation. The SPIBE Immunoassay using synthetic peptides representing the dominant antigenic determinants of both the NS-2 and VP7 protein instead of native proteins can further be developed into a rapid and more accurate assay and a potential commercial diagnostic kit that will can easily determine and distinguish whether animal is infected by BTV or vaccinated with BTV vaccines. Once it is developed into the high throughput system (HTS), it will also provide more accurate results for global import and export of live stocks as well as to trace the spread of BTVs due to global warming as reported in northern and central Europe in the last two years. The two potential anti-BTV drugs that have been identified might have potential future uses to

inhibit BTV infection in domestic cattle and wild ruminants in the near future.

This project will look at specific gene expression levels in bovine embryos produced by nuclear transplantation. Nuclear transfer derived embryos have a very low rate of development to term. The purpose of this study is to identify key gene expression levels responsible for reprogramming bovine adult cell nuclei into a state mimicking that of a normal embryo. The purpose of this study is to identify key mechanisms responsible for reprogramming bovine adult cell nuclei into a state mimicking that of a normal fertilized embryo. In addition, these studies will provide insight into identifying unique metabolic factors that are critical to three stages of preimplantation embryonic development: a) fertilization, b) maternal to zygotic transition, and c) first stages of differentiation. Knowledge gained from these studies will have a significant impact on our understanding of how to reset the gene expression profile of adult nuclei into that of an undifferentiated or pluripotent state.

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. Many cheeses must be stored at low temperature for months or years before they attain characteristic flavor. During this time, termed the ripening period, microorganisms and enzymes in the cheese matrix act on milk constituents in a manner that ultimately gives the desired product. 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 project has established the contribution of several key enzymes and metabolic pathways in CNRZ32 to cheese maturation and flavor chemistry, and should establish similar outcomes with L. casei. Additional work in this area is ongoing. 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 USU 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 long-term cell survival. Findings reinforce our fundamental understanding of the genetics and physiology of these bacteria in foods. Whey-based 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 76 million foodborne illness cases occur in the United States 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 county, in consumers that participate in home food preservation and storage. 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). 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. This course was

dramatically improved in 2007. The course is modeled after the five major risk factors identified by the CDC as causing most foodborne illnesses at the foodservice level. Exams are bilingual to assist Spanish-speaking foodservice managers. Each county in Utah supports the course and provides access to materials and testing. Safe food behaviors at the consumer and retail-foodservice 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. Changing behavior is a key to minimizing risks that lead to foodborne illness.

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 the Needles District of Canyonlands National Park, and in mapping 200,000 acres of rangeland in Beaver County, Utah, and 20,000 acres of rangeland in southern Nevada in a research-UCES 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.

The "On-Target" program helps implement simple, low-cost instruments and methods that can identify surface soil carbon percentages from space, airborne, and tractor-mounted platforms to "benchmark" growers. One Benchmark farmer estimated the savings on their farm to be at least $17 per acre, over 2000 acres of irrigated farmland. Testing of Fassio Farms Compost by USU has helped them to secure an OMRI certification as an organic fertility amendment. They now have a new market open to them in the distribution of their product.

Education and research results on landscape irrigation and particularly turfgrass 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 project examining 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.

Various nurseries have incorporated the pot-in-pot production approach into their respective operations due to ongoing research and UCES efforts. If low maintenance turf grasses these 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. 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. Fifty-five percent of the farmers in the Beaver River Watershed have participated in one or more of our cost share or educational programs. These farmers have reduced the amount of manure and sediment entering the Beaver River and Minerville Reservoir.

Nearly 700 people attended the 2007 Utah Water User's meeting, one of the most significant public meetings in Utah's water resource community which included both UCES and research scientists. For example, the rancher (and County Commissioner) in Rich County who modified his irrigation schedule for the soil type and wheel line nozzle size based on information in an UCES Electronic Fact Sheet increased his production by 30 - 920 lb bales on a 200 acre alfalfa field. Water conservation methods (both in transport and in use) and water quality enhancement guidelines have proven very effective in enhancing Utah's waterways and

water sources.

Natural Resources Systems and Environment Programs

Invasive weeds are one of the greatest threats to range resources in the West. The USU wildfire and weed management program provides inventory and mapping techniques, evaluation of potential control methods and an emphasis on early detection and rapid response (EDRR), all important elements in controlling these weeds. 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 weeds is cheatgrass. Research continues on the best approach for cheatgrass and other invasive species by the UAES.

USU rangeland efforts include studies of application of bio-solids. In Tooele County, forage production was increased from 84 lbs/acre for control plots to as much as 664 lbs/acre for one of the treatments. Forage quality was increased as well from 10% crude protein for control plots to 20% for treatments. Application of bio-solids to disturbed rangelands has also increased water retention, soil organic matter, stocking rate and species diversity.

UCES is helping to establish new vegetation on rangelands. In Iron, Kane, and Garfield Counties the planting of 17,225 conservation trees and shrubs equates to over $5 million in economic value to residents. Additionally, the trees beautify the area and provide diversity and wildlife habitat.

Attendees at UCES's Professional Tree Care Workshops learn better tree and forest management techniques which are passed on to over 143,000 clients a year who work on or with over 85,000 trees. This program produces high quality and well used materials including a web article, "Landscape Trees and Global Warming", which is listed as number one or two using a Google search for "trees global warming." In addition, "Firewise Landscaping for Utah" has been distributed to over 10,000 individuals and is now on its second printing of 5,000 copies. Much of this work is based on UAES research.

Assistance to family forests helps protect up 20 percent of Utah's forest land. Urban forestry programs, which are a product of both research and UCES efforts, include educating cities on tree plantings that reduce fire hazards and improve value of homes. UCES'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 wildlife UCES 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 $15 million in new revenue for Utah landowners and provides free access to over 3,000 Utah hunters annually to high quality big game hunting opportunities. These programs had their origin in research conducted by the UAES.

To protect and keep Sage Grouse habitat in Utah, USU's Wildlife UCES and Experiment Station have organized local work groups which have taken the lead in protecting sage grouse habitat. This has increased Sage Grouse numbers and avoided the need to list the species as threatened or endangered. USU's leadership is essential, allowing the group to identify issues, concerns and management strategies; to build group consensus; to schedule and organize meetings; to prepare and distribute meeting minutes; to write drafts of local conservation plans and agreements; and to help implement and monitor management actions identified in the documents. As a result, stable and increasing Sage Grouse populations are now being seen in multiple counties across the state.

Utah Gunnison's prairie dog and white-tailed prairie dog conservation plan involved extensive public input, facilitated by USU wildlife's UCES program. County supports for these programs include Wayne and Piute Counties. A twenty acre parcel of irrigated pasture was seeded to species preferred by listed prairie dogs and another twenty acres was tilled and seeded to livestock/prairie dog forage. Another rancher, Piute County and USFWS agreed to cooperatively improve 15 acres of existing prairie dog habitat that is being invaded by rabbit brush. Three other cooperators have completed the following practices: 1) land preparation and seeding of twenty acres of dry land grass and forbs; 2) establishment of new irrigation system and soil preparation for 40 acres of prairie dog/sheep/cattle pasture; 3) installation of irrigation system to produce prairie dog/cattle pasture. In a Sage brush thinning and demonstration/research treatment, herbicide granules were successfully applied to one thousand acres of critical prairie dog and grouse habitat.

USU's involvement on the Utah Office of Tourism Board is critical, due to the economic impact of the travel and tourism industry. For example, in 2006, estimates of non-resident tourism arrivals increased 1.0% to 19.3 million. This resulted in an increase in traveler spending estimated at 7.7% to $5.87 billion, resulting in the generation of an estimated $467 million in state and local tax revenues. There were an estimated 125,800 jobs in travel and tourism-related industries (86,500 direct and 39,300 indirect tourism jobs), approximately 10% of total Utah non-farm jobs. Much of this can be attributed to the UOT's marketing efforts made possible by increased legislative appropriations.

Family Nights at Utah Botanical Center introduced approximately 500 members of the local community, to the values of natural resources, wetlands and horticulture. Over 3,800 K-12 students visited the Utah Botanical Center and gained knowledge about the natural world and is based on UCES outreach and Experiment Station research efforts.

USU's water quality program provided over 6,500 kids with water quality educational activities (at least an hour in length) through classroom visits, field days and camps and increased the skills of 250 educators, who each will relay these messages to hundreds of children each year. Follow up surveys with educators indicate that about 30% continue to use these methods in their classrooms, reaching thousands of additional students each year. 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 long-run climate data in response to concerns about global warming and its potential impacts on the Intermountain West.

Research has been done in the area of behavioral studies of animals, including domestic livestock (BEHAVE Project). Results suggest that if sufficient plant variety is available for grazing, livestock will graze in such an area in such a manner as to self-medicate for various toxins found in different plat groups. This further suggests that grazing of livestock (and more generally, animals) should be done in areas of increased plant diversity and that grazing plant monocultures does n

Total Actual Amount of professional FTEs/SYs for this State

Year:2007	Extension		Research	
	1862	1890	1862	1890
Plan	158.0	0.0	37.5	0.0
Actual	153.0	0.0	63.2	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
- 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 are frequently used by Utah counties to encourage participation in public meetings and listening sessions 77% of reporting Utah counties reported using this methodology. Use of the local newspaper and radio through public service announcements and advertisements as well as paid advertisement are the two primary techniques applied with the media. Targeted invitations to groups are more the norm with 24 out of 27 counties responding that they targeted traditional stakeholders through invitation 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 69% 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 85% and 73% respectively of reporting counties utilizing this process. Surveys serve as another means for contacting stakeholders. 58% of counties reported utilizing surveys to traditional stakeholder individuals and less than 10% utilized surveys to the general public. Utah Extension applies 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

Utah Extension utilizes advisory committees as their primary means of identifying individuals and groups who are stakeholders to collect input from them. Primary 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, previous program participating Extension stakeholders and afterschool coalitions have been utilized. Over 95% of reporting counties (26) utilized this contact methodology. About a quarter of reporting counties (26) indicated that they used focus groups and open listening sessions as means to identify groups and individual stakeholders. Over 50% of reporting counties (26) indicated that the use of needs assessments and surveys provided another primary means of identifying individuals and groups to collect input from them. The Utah Agricultural Experiment Station uses an advisory group that meets as needed to provide

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 finds that meeting with traditional stakeholders, often times in expansion and review settings, has been an effective method for identifying program and administrative issues important to county residents. Over 95% of reporting counties (26) utilized this method. The second highest methodology utilized was meeting individually with these stakeholders with over 84% of reporting counties (26) applying this process. Some counties reported face-to-face interviews with stakeholders with Limited English Proficiency (LEP) by providing native speakers to conduct a “wants and needs” analysis. More than half of all reporting counties (26) indicated that they surveyed traditional stakeholder groups and individuals; met specifically with non-traditional groups and individuals and held meetings with invited selected individuals from the general public. Over one third of the counties reported utilizing open meetings advertised to the public as a means of obtaining input. The methodologies used less than 25% of the time included the use of surveys with specifically non-traditional individuals and the survey of selected individuals from the general public. The Experiment Station has utilized

3. A statement of how the input was considered

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

Brief Explanation

The input received from stakeholders was utilized most to gather information on emerging issues (96%) to redirect extension programs (84%) and to set priorities as an Extension organization (76%). 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 these urban and suburban populations. To a lesser extent input was applied to the Extension programs in redirecting research programs (26%) in the hiring of staff (30%) and in the action plans of the county (38%). Even these inputs however, frequently informs Extension through influencing recruitment and hiring practices and informs Extension on the types of research that stakeholders perceive as important

Brief Explanation of what you learned from your Stakeholders

Stakeholder input sessions have helped Extension learn to better address hiring practices to include improved advertising/hiring qualified women and underserved audiences in county offices. ~ Farmers in general have a preference for Extension programs which provide “hands on” training in the field coupled with educational research plots that help them more clearly visualize the impacts of new and improved practices. ~ Extension programs must become more effective at developing and offering programs to serve the needs of small acreage farm and ranch owners. ~ Extension 4-H and youth programs are critical to strengthening the fabric of the community as traditional families disintegrate. ~ Focused programs in horticulture such as the Master Gardener program are critical to an ever increasing urban/suburban population in Utah. ~ Natural resources programs are key offerings in a state with more than 60% of its landmass under federal stewardship. ~ Programs which strengthen families through personal/family finance, health, nutrition and aging are critical to Utah populations. The Experiment Station has learned that the current areas of focus are the primary ones identified by the various clientele groups as sampled through Utah Extension.

IV. Expenditure Summary

1. Total Actual Formula dollars Allocated (prepopulated from C-REEMS)

Extension		Research	
Smith-Lever 3b & 3c	**1890 Extension**	**Hatch**	**Evans-Allen**
1551272	0	3144456	0

2. Totaled Actual dollars from Planned Programs Inputs				
	Extension		Research	
	Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
Actual Formula	1468558	0	1821163	0
Actual Matching	1919459	0	1821163	0
Actual All Other	0	0	19941434	0
Total Actual Expended	3388017	0	23583760	0

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

V. Planned Program Table of Content

Program #1

V(A). Planned Program (Summary)

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	15%		15%	
608	Community Resource Planning and Development	60%		60%	
610	Domestic Policy Analysis	10%		10%	
803	Sociological and Technological Change Affecting Individuals,	15%		15%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

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

Year: 2007	Extension		Research	
	1862	1890	1862	1890
Plan	4.0	0.0	2.9	0.0
Actual	11.8	0.0	2.7	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
115181	0	60421	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
150546	0	60421	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	636698	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

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

Year	Direct Contacts Adults Target	Indirect Contacts Adults Target	Direct Contacts Youth Target	Indirect Contacts Youth Target
Plan	1800	2272	0	0
2007	14068	1850	10674	1677

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

Patent Applications Submitted

Year	Target
Plan:	0
2007 :	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

	Extension	Research	Total
Plan			
2007	0	11	11

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
2007	10	11

Output #2

Output Measure

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

Year	Target	Actual
2007	3	36

Output #3

Output Measure

- Level of contract/grant funding

Year	Target	Actual
2007	20000	189874

Output #4

Output Measure

- Number of graduate students trained

Year	Target	Actual
2007	2	14

Output #5

Output Measure

- Number of undergraduate students involved in research

Year	Target	Actual
2007	2	5

Output #6

Output Measure

- Number of theses/dissertations completed

Year	Target	Actual
2007	2	0

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	Increase in local area protection expressed in percentage terms for those areas implementing protection.
5	Maintenance of rural community services expressed by the expenditures of communities assisted.
6	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

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2007	540	7646

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

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

Outcome #2

1. Outcome Measures

Number of clients who implement land use and sustainable communities practices

2. Associated Institution Types

•1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2007	270	1310

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

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

Outcome #3

1. Outcome Measures

Number of communities preserving desirable community attributes

2. Associated Institution Types

•1862 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2007	2	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
131	Alternative Uses of Land
608	Community Resource Planning and Development

Outcome #4

1. Outcome Measures

Increase in local area protection expressed in percentage terms for those areas implementing protection.

2. Associated Institution Types

•1862 Extension

3a. Outcome Type:
Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2007	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
131	Alternative Uses of Land

Outcome #5

1. Outcome Measures
Maintenance of rural community services expressed by the expenditures of communities assisted.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:
Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2007	1	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
803	Sociological and Technological Change Affecting Individuals, Families and Communities
131	Alternative Uses of Land
608	Community Resource Planning and Development
610	Domestic Policy Analysis

Outcome #6

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).

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2007	2	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
803	Sociological and Technological Change Affecting Individuals, Families and Communities
131	Alternative Uses of Land
608	Community Resource Planning and Development
610	Domestic Policy Analysis

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

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
- 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

The primary evaluation results at this point are time series data that show the urban-rural income gap and the change from the preceding base period.

Key Items of Evaluation

None

Program #2

V(A). Planned Program (Summary)

1. Name of the Planned Program

Sustainable Plant 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
201	Plant Genome, Genetics, and Genetic Mechanisms	10%		10%	
202	Plant Genetic Resources	10%		10%	
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plar	10%		10%	
204	Plant Product Quality and Utility (Preharvest)	10%		10%	
205	Plant Management Systems	10%		10%	
211	Insects, Mites, and Other Arthropods Affecting Plants	10%		10%	
212	Pathogens and Nematodes Affecting Plants	10%		10%	
213	Weeds Affecting Plants	10%		10%	
215	Biological Control of Pests Affecting Plants	10%		10%	
216	Integrated Pest Management Systems	10%		10%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

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

Year: 2007	Extension		Research	
	1862	1890	1862	1890
Plan	33.0	0.0	8.7	0.0
Actual	37.2	0.0	12.2	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
355142	0	498252	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
464183	0	498252	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	7296993	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.

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

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

	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Year	Target	Target	Target	Target
Plan	85000	1052460	2900	35907
2007	49479	580868	10201	116660

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

Patent Applications Submitted

Year	Target
Plan:	0
2007 :	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

	Extension	Research	Total
Plan			
2007	0	33	33

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of variety or seed releases

Year	Target	Actual
2007	1	2

Output #2

Output Measure

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

Year	Target	Actual
2007	18	33

Output #3

Output Measure

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

Year	Target	Actual
2007	2	53

Output #4

Output Measure

- Level of contract/grant funding

Year	Target	Actual
2007	100000	3973771

Output #5

Output Measure

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

Year	Target	Actual
2007	2	17

Output #6

Output Measure

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

Year	Target	Actual
2007	0	0

Output #7

Output Measure

- Number of undergraduate students involved in research

Year	Target	Actual
2007	2	6

Output #8

Output Measure

- Number of theses/dissertations completed

Year	Target	Actual
2007	3	5

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O No.	Outcome Name
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
2007	25500	30416

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

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

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

Year	Quantitative Target	Actual
2007	12750	15482

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

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

Outcome #3

1. Outcome Measures

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

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2007	2	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
211	Insects, Mites, and Other Arthropods Affecting Plants
216	Integrated Pest Management Systems
212	Pathogens and Nematodes Affecting Plants
205	Plant Management Systems
213	Weeds Affecting Plants

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
2007	2	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
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
213	Weeds Affecting Plants
202	Plant Genetic Resources
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Pathogens and Nematodes Affecting Plants
204	Plant Product Quality and Utility (Preharvest)
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 Programatic Challenges
- Populations changes (immigration,new cultural groupings,etc.)
- Other (weeds, biofuels, petroleum product costs)

Brief Explanation

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

Key Items of Evaluation

Program #3

V(A). Planned Program (Summary)

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	10%		10%	
302	Nutrient Utilization in Animals	20%		20%	
303	Genetic Improvement of Animals	10%		10%	
305	Animal Physiological Processes	10%		10%	
306	Environmental Stress in Animals	5%		5%	
307	Animal Management Systems	20%		20%	
311	Animal Diseases	10%		10%	
314	Toxic Chemicals, Poisonous Plants, Naturally Occuring Toxir	5%		5%	
402	Engineering Systems and Equipment	5%		5%	
722	Zoonotic Diseases and Parasites Affecting Humans	5%		5%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

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

Year: 2007	Extension		Research	
	1862	1890	1862	1890
Plan	17.0	0.0	3.7	0.0
Actual	42.3	0.0	10.6	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
403134	0	186567	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
526910	0	186567	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	2073886	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

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

	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Year	Target	Target	Target	Target
Plan	26000	54577	15000	31487
2007	22273	72420	6324	15105

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

Patent Applications Submitted

Year	Target
Plan:	0
2007 :	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

	Extension	Research	Total
Plan			
2007	0	11	11

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
2007	40	11

Output #2

Output Measure

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

Year	Target	Actual
2007	10	38

Output #3

Output Measure

- Level of contract/grant funding

Year	Target	Actual
2007	100000	391414

Output #4

Output Measure

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

Year	Target	Actual
2007	2	13

Output #5

Output Measure

- Number of undergraduate students involved in research

Year	Target	Actual
2007	2	4

Output #6

Output Measure

- Number of theses/dissertations completed

Year	Target	Actual
2007	2	3

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O No.	Outcome Name
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
2007	7800	10268

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
302	Nutrient Utilization in Animals
311	Animal Diseases
307	Animal Management Systems

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
2007	3900	4030

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
311	Animal Diseases
302	Nutrient Utilization in Animals
307	Animal Management Systems

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
2007	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
305	Animal Physiological Processes
302	Nutrient Utilization in Animals
307	Animal Management Systems
311	Animal Diseases
314	Toxic Chemicals, Poisonous Plants, Naturally Occuring Toxins, and Other Hazards Affecting Animals
303	Genetic Improvement of Animals
301	Reproductive Performance of Animals

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
2007	1	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
311	Animal Diseases
302	Nutrient Utilization in Animals
307	Animal 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 Programatic Challenges
- Populations changes (immigration,new cultural groupings,etc.)
- Other (Diseases; Invasive Species)

Brief Explanation

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

Key Items of Evaluation

Program #4

V(A). Planned Program (Summary)

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 Plai	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%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

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

Year: 2007	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.0	7.9	0.0
Actual	0.0	0.0	14.0	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
0	0	572755	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	572755	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	3059524	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

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

	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Year	Target	Target	Target	Target
Plan	30	60	20	40
2007	0	0	0	0

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

Patent Applications Submitted

Year	Target
Plan:	0
2007 :	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

	Extension	Research	Total
Plan			
2007	0	76	76

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
2007	40	76

Output #2

Output Measure

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

Year	Target	Actual
2007	3	80

Output #3

Output Measure

- Level of contract/grant funding

Year	Target	Actual
2007	500000	373928

Output #4

Output Measure

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

Year	Target	Actual
2007	2	23

Output #5

Output Measure

- Number of undergraduate students involved in research

Year	Target	Actual
2007	2	10

Output #6

Output Measure

- Number of theses/dissertations completed

Year	Target	Actual
2007	2	2

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.

2. Associated Institution Types

•1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2007	0	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
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
301	Reproductive Performance of Animals
304	Animal Genome
305	Animal Physiological Processes
303	Genetic Improvement of Animals
501	New and Improved Food Processing Technologies
201	Plant Genome, Genetics, and Genetic Mechanisms

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Economy
- Appropriations changes
- Public Policy changes
- Government Regulations
- Competing Public priorities
- Competing Programatic Challenges

Brief Explanation

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

Key Items of Evaluation

Program #5

V(A). Planned Program (Summary)

1. Name of the Planned Program

Production and Safety of Food Products

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
501	New and Improved Food Processing Technologies	20%		20%	
511	New and Improved Non-Food Products and Processes	15%		15%	
701	Nutrient Composition of Food	15%		15%	
702	Requirements and Function of Nutrients and Other Food Cor	20%		20%	
711	Ensure Food Products Free of Harmful Chemicals, Including	10%		10%	
712	Protect Food from Contamination by Pathogenic Microorgani	20%		20%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

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

Year: 2007	Extension		Research	
	1862	1890	1862	1890
Plan	11.0	0.0	3.3	0.0
Actual	1.3	0.0	7.5	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
9598	0	240584	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
12545	0	240584	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	1903320	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

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

Year	Direct Contacts Adults Target	Indirect Contacts Adults Target	Direct Contacts Youth Target	Indirect Contacts Youth Target
Plan	24000	33043	700	963
2007	2802	3395	902	1788

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

Patent Applications Submitted

Year	Target
Plan:	0
2007 :	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

	Extension	Research	Total
Plan			
2007	0	17	17

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
2007	15	17

Output #2

Output Measure

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

Year	Target	Actual
2007	2	27

Output #3

Output Measure

- Level of contract/grant funding

Year	Target	Actual
2007	50000	82619

Output #4

Output Measure

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

Year	Target	Actual
2007	2	18

Output #5

Output Measure

- Number of undergraduate students involved in research

Year	Target	Actual
2007	2	10

Output #6

Output Measure

- Number of theses/dissertations completed

Year	Target	Actual
2007	2	6

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
2007	7200	1577

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

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

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
2007	3600	802

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

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

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

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2007	12	10

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

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

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

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2007	1	3

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

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

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

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2007	14	11

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

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

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 Programatic Challenges
- Populations changes (immigration,new cultural groupings,etc.)

Brief Explanation

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

Key Items of Evaluation

Program #6

V(A). Planned Program (Summary)

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	10%		10%	
102	Soil, Plant, Water, Nutrient Relationships	20%		20%	
103	Management of Saline and Sodic Soils and Salinity	5%		5%	
104	Protect Soil from Harmful Effects of Natural Elements	5%		5%	
111	Conservation and Efficient Use of Water	20%		20%	
112	Watershed Protection and Management	10%		10%	
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plai	10%		10%	
205	Plant Management Systems	10%		10%	
213	Weeds Affecting Plants	5%		5%	
605	Natural Resource and Environmental Economics	5%		5%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

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

Year: 2007	Extension		Research	
	1862	1890	1862	1890
Plan	8.0	0.0	3.3	0.0
Actual	7.4	0.0	6.4	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
67189	0	109129	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
87818	0	109129	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	1892534	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

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

	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Year	Target	Target	Target	Target
Plan	6720	2589	10200	3930
2007	24064	36840	4468	4449

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

Patent Applications Submitted

Year	Target
Plan:	0

2007 : 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

	Extension	Research	Total
Plan			
2007	0	31	31

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
2007	40	31

Output #2

Output Measure

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

Year	Target	Actual
2007	2	30

Output #3

Output Measure

- Level of contract/grant funding

Year	Target	Actual
2007	50000	2001663

Output #4

Output Measure

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

Year	Target	Actual
2007	2	14

Output #5

Output Measure

- Number of undergraduate students involved in research

Year	Target	Actual
2007	2	4

Output #6

Output Measure

- Number of theses/dissertations completed

Year	Target	Actual
2007	1	6

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
2007	2016	9619

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
112	Watershed Protection and Management
111	Conservation and Efficient Use of Water
205	Plant Management Systems
102	Soil, Plant, Water, Nutrient Relationships
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
2007	1008	7000

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
213	Weeds Affecting Plants
605	Natural Resource and Environmental Economics
111	Conservation and Efficient Use of Water
102	Soil, Plant, Water, Nutrient Relationships
112	Watershed Protection and Management
101	Appraisal of Soil Resources
205	Plant Management Systems

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

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2007	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
605	Natural Resource and Environmental Economics
112	Watershed Protection and Management
102	Soil, Plant, Water, Nutrient Relationships
111	Conservation and Efficient Use of Water
213	Weeds Affecting Plants
205	Plant Management Systems
101	Appraisal of Soil Resources

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

3a. Outcome Type:
Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2007	30	32

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
213	Weeds Affecting Plants
205	Plant Management Systems
111	Conservation and Efficient Use of Water
112	Watershed Protection and Management
605	Natural Resource and Environmental Economics
101	Appraisal of Soil Resources

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 Programatic Challenges
- Populations changes (immigration,new cultural groupings,etc.)

Brief Explanation

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

Key Items of Evaluation

Program #7

V(A). Planned Program (Summary)

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	10%		10%	
121	Management of Range Resources	20%		20%	
122	Management and Control of Forest and Range Fires	5%		5%	
123	Management and Sustainability of Forest Resources	20%		20%	
125	Agroforestry	5%		5%	
134	Outdoor Recreation	5%		5%	
135	Aquatic and Terrestrial Wildlife	10%		10%	
136	Conservation of Biological Diversity	5%		5%	
141	Air Resource Protection and Management	10%		10%	
605	Natural Resource and Environmental Economics	10%		10%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

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

Year: 2007	Extension		Research	
	1862	1890	1862	1890
Plan	13.0	0.0	5.1	0.0
Actual	3.5	0.0	6.8	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
38394	0	80822	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
50182	0	80822	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	1842902	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

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

	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Year	Target	Target	Target	Target
Plan	25800	17473	13000	8804
2007	10051	182993	10445	13324

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

Patent Applications Submitted

Year	Target
Plan:	0
2007 :	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

	Extension	Research	Total
Plan			
2007	0	58	58

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
2007	50	58

Output #2

Output Measure

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

Year	Target	Actual
2007	8	70

Output #3

Output Measure

- Level of contract/grant funding.

Year	Target	Actual
2007	50000	96278

Output #4

Output Measure

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

Year	Target	Actual
2007	2	15

Output #5

Output Measure

- Number of undergraduate students involved in research.

Year	Target	Actual
2007	2	8

Output #6

Output Measure

- Number of theses/dissertations completed.

Year	Target	Actual
2007	3	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.
3	Percent of permitted acres maintained at appropriate land conditions and water and air standards.

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
2007	7740	20562

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
121	Management of Range Resources
123	Management and Sustainability of Forest Resources
134	Outdoor Recreation
112	Watershed Protection and Management
136	Conservation of Biological Diversity
135	Aquatic and Terrestrial Wildlife

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
2007	3870	3659

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
123	Management and Sustainability of Forest Resources
136	Conservation of Biological Diversity
134	Outdoor Recreation
135	Aquatic and Terrestrial Wildlife
112	Watershed Protection and Management
121	Management of Range Resources

Outcome #3

1. Outcome Measures

Percent of permitted acres maintained at appropriate land conditions and water and air standards.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2007	65	60

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

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

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 Programatic Challenges
- Populations changes (immigration,new cultural groupings,etc.)

Brief Explanation

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

Key Items of Evaluation

Program #8

V(A). Planned Program (Summary)

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	10%		10%	
602	Business Management, Finance, and Taxation	5%		5%	
603	Market Economics	15%		15%	
604	Marketing and Distribution Practices	15%		15%	
605	Natural Resource and Environmental Economics	15%		15%	
606	International Trade and Development	10%		10%	
607	Consumer Economics	5%		5%	
608	Community Resource Planning and Development	5%		5%	
609	Economic Theory and Methods	15%		15%	
611	Foreign Policy and Programs	5%		5%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

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

Year: 2007	Extension		Research	
	1862	1890	1862	1890
Plan	7.0	0.0	1.2	0.0
Actual	5.6	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
57591	0	56439	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
75273	0	56439	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	763767	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

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

	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Year	Target	Target	Target	Target
Plan	10000	11861	500	593
2007	15684	22120	522	705

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

Patent Applications Submitted

Year	Target
Plan:	0
2007 :	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

	Extension	Research	Total
Plan			
2007	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.

Year	Target	Actual
2007	10	7

Output #2

Output Measure

- Level of contract/grant funding.

Year	Target	Actual
2007	50000	426430

Output #3

Output Measure

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

Year	Target	Actual
2007	3	15

Output #4

Output Measure

- Number of graduate students trained.

Year	Target	Actual
2007	2	10

Output #5

Output Measure

- Number of undergraduate students involved in research.

Year	Target	Actual
2007	2	3

Output #6

Output Measure

- Number of theses/dissertations completed.

Year	Target	Actual
2007	2	6

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 1% 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

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2007	3000	7341

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
604	Marketing and Distribution Practices
602	Business Management, Finance, and Taxation
601	Economics of Agricultural Production and Farm Management
603	Market Economics
608	Community Resource Planning and Development

Outcome #2

1. Outcome Measures

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

2. Associated Institution Types

•1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2007	1500	2533

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
608	Community Resource Planning and Development
602	Business Management, Finance, and Taxation
603	Market Economics
604	Marketing and Distribution Practices
601	Economics of Agricultural Production and Farm Management

Outcome #3

1. Outcome Measures

A 1% 12 month increase in manufacturing employment in Utah.

2. Associated Institution Types

•1862 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2007	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
608	Community Resource Planning and Development
602	Business Management, Finance, and Taxation
604	Marketing and Distribution Practices
603	Market Economics
601	Economics of Agricultural Production and Farm Management

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

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

Key Items of Evaluation

Program #9

V(A). Planned Program (Summary)

1. Name of the Planned Program

Individuals, Families, and 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
701	Nutrient Composition of Food	10%		10%	
702	Requirements and Function of Nutrients and Other Food Cor	5%		5%	
703	Nutrition Education and Behavior	15%		15%	
704	Nutrition and Hunger in the Population	5%		5%	
801	Individual and Family Resource Management	20%		20%	
802	Human Development and Family Well-Being	15%		15%	
803	Sociological and Technological Change Affecting Individuals,	10%		10%	
806	Youth Development	20%		20%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

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

Year: 2007	Extension		Research	
	1862	1890	1862	1890
Plan	65.0	0.0	1.5	0.0
Actual	44.0	0.0	1.6	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
422329	0	16194	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
552002	0	16194	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	471810	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

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

	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Year	**Target**	**Target**	**Target**	**Target**
Plan	45000	10637	220000	694600
2007	150781	211187	433686	607430

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

Patent Applications Submitted

Year	Target
Plan:	0
2007 :	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

	Extension	Research	Total
Plan			
2007	0	19	19

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
2007	25	19

Output #2

Output Measure

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

Year	Target	Actual
2007	5	27

Output #3

Output Measure

- Level of contract/grant funding.

Year	Target	Actual
2007	25000	0

Output #4

Output Measure

- Number of graduate students trained.

Year	Target	Actual
2007	20000	9

Output #5

Output Measure

- Number of undergraduate students involved in research.

Year	Target	Actual
2007	2	3

Output #6

Output Measure

- Number of theses/dissertations completed.

Year	Target	Actual
2007	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 Adult Graduates Who Reported Seven or More Days Physical Health NOT Good in the Past 30 Days. (Less than or equal to the 2004 Utah IBI-PH Indicator, Income less than $20,000.)

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

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2007	21400	228092

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

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

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

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2007	11700	131427

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

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

Outcome #3

1. Outcome Measures

Percentage of Adult Graduates Who Reported Seven or More Days Physical Health NOT Good in the Past 30 Days. (Less than or equal to the 2004 Utah IBI-PH Indicator, Income less than $20,000.)

2. Associated Institution Types

•1862 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2007	23	31

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

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

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

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

1. Evaluation Studies Planned

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

Key Items of Evaluation