2012 Utah State University Combined Research and Extension Annual Report of Accomplishments and Results

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I. Report Overview

1. Executive Summary

The Utah Agricultural Experiment Station (UAES) and Utah Cooperative Extension Service (UCES) work in five major program areas: (1) Global Food Security and Hunger, (2) Climate Change and Natural Resource Use (3) Sustainable Energy (4) Childhood obesity, nutrition, and community, and (5) Food Safety. A 2012 progress report on each is briefly described below.

GLOBAL FOOD SECURITY AND HUNGER

AgrAbility of Utah

Farmers and ranchers facing limitations due to illness, injury, or disability often find it difficult to remain in agriculture. UCES provides education, and technical assistance on modifications and assistive technology devices to help them remain in agriculture. To date AgrAbility has helped over 200 agriculturalists and their families remain in agriculture.

Integrated Pest Management

UCES provides outreach education in entomology and integrated pest management (IPM). The program involves collaborative efforts of entomologists, plant pathologists, weed scientists, and horticulturalists. Outreach education is targeted to county Extension staff, agricultural producers, Master Gardeners, relevant federal and state agency personnel, and the general public. This program has had a positive impact on pesticide use in Utah, resulting in fewer unnecessary pesticide sprays, and an increase use of low-toxicity and non-chemical products. According to a 2012 fall survey, 55% of respondents say they have reduced their use of broad-spectrum insecticides and 47% have switched to using only selective/soft/organic materials. Respondents to the survey said they now monitor for pests before spraying (83%), monitor plant health (31%), and use degree days (17%).

Important outcomes of UAES research regarding integrated pest managements was the determination of the seasonal timing of infestation of Utah small grain fields by the cereal leaf beetle, the seasonal timing of the pest's parasitism, a parasitic wasp, identification of major factors that are limiting how much the cereal leaf beetle is parasitized by its enemy (the wasp) including fall tillage and the lack of food (e.g., nectar from flowers) for adult wasps in grain monoculture.

Another UAES project demonstrated lady beetles are major predators of the alfalfa weevil as well as pest aphids in Utah alfalfa fields. The project demonstrated a lady beetle from Europe is now the most abundant lady beetle in Utah alfalfa fields, and this introduced species is especially responsive to alfalfa weevil larvae as prey. Therefore to protect these highly beneficial predators, insecticides should not be used except when absolutely necessary for insect pest control in alfalfa.

Horticulture

UAES and UCES horticulture programs provide the latest research-based, non-biased, easily accessible horticultural information to homeowners; business owners; city, county, state and other agencies; and the green industry. A relatively high percentage of Utah homeowners have tree and berry plants in their home gardens. There is a large demand for information on proper care and maintenance of these fruiting plants. Research by UAES enabled raspberry growers and home gardeners to properly time insecticide applications and reduces the number of total applications from three to one or two each year. For the 80 acres of raspberries monitored in 2011, the average increase in profitability from horntail control was approximately $325 per acre for a total increase in profits of $26,000. In 2012 UCES helped 8 HIGH TUNNEL growers achieve higher tomato yields, improved tomato and pepper earliness, and grow earlier

sweet corn thus netting increased farm profits. Growers reported they were able to sell more tomatoes at higher prices with one saying he made more than $20,000 from his tunnel enterprise. One pepper growers noted work on nitrogen and color development provided nearly $15,000 in additional income. Growers using high tunnels captured early tomato markets with prices 3-4 times higher and held markets later in the year. UCES assisted one grower with winter squash storage issues saving him over $90,000 in potential losses. This grower is now using USU crop rotation and reduced nitrogen fertility approaches in onion are saving between $250-300 per acre. Estimate more than 350 acres now using program.

Research conducted under a UAES project show Utah's Own designation was recognized by approximately 80% of Utah shoppers in an in-store survey and the shoppers saw the Utah's Own label as contributing in a positive way to Utah's food economy. The same study found the Utah's Own designation had a significant positive effect on Utah shopper willingness to pay for a packaged food product, ice cream. For example, estimated willingness to pay (WTP) for one local ice cream product increased by about $0.86 per half gallon when the Utah's Own designation was added. WTP for another local ice cream designated as being "locally-produced" without a Utah's Own designation was estimated to be $0.63 per half gallon. Utah's Own designation brought an extra $0.23/gallon.

More than 375 acres of Utah's onions now use a reduced N-reduce spray program to help manage thrips resulting in reduced pesticide applications. Growers report saving approximately $100/acre in nitrogen costs or about $37,500 and $200 or more/acre savings in insecticide spray costs totaling $7,500). Reduced nitrogen losses off farm and significantly lower pesticides use makes onions on these farms more sustainable. UAES research has shown onions after corn have few thrips and less Iris Yellow Spot Virus (IYSV.) Growers are adopting and transitioning their production practices to take advantage of this research. All of the growers participating in winter educational meetings or joining summer field tours are able to identify onion thrips and determine if they are causing damage. They can identify IYSV and more than 80% know how the virus is transmitted and can create solutions to control the insects. Growers report more than 1/3 of the onion acreage is now being grown after corn rather than after wheat.

Most of the largest growers in Utah have indicated they have altered fertilizer management strategies to reflect the results of UAES studies. The tart cherry industry in Utah is the highest producing region in the US, accounting for $6.25 million in production on over 1,300 hectares (over 3,200 acres) state wide. Our studies indicate annual application of fertilizer can increase the productivity of a cherry orchard by as much 200 percent over the life of the orchard (compared to unfertilized orchards). Such an increase, for a crop on average grosses more than $4,800 per ha, could mean an increase of amount in gross income per ha on the lowest producing fields. Utah cherry growers learned how effective P and K additions can be, and traditional fertilizers were as effective as newer more expensive formulations. Those farm managers chose to implement a more aggressive fertility program observed near record high yields in both 2011 and 2012, with every indication of high yields again in 2013. The ability of cherry trees to repeatedly produce large crops can be attributed to better fertility management, due in part to findings of UAES research. By using the lower cost traditional fertilizers in these aggressive programs, these growers are saving $110 to $240 per acre per year.

Utah peach growers increased their awareness of earwig population densities in orchards through use of earwig monitoring traps. Prior to this study, growers did not monitor earwig populations. Trapping results presented at fruit grower meetings and field days, and in a new fact sheet have contributed to increased knowledge on earwig monitoring and biology. It is anticipated use of traps will result in a decrease in injury to peach fruits resulting from optimal timing of effective insecticides for earwig control. In addition, growers learned both a reduced-risk and conventional insecticide (Success and Sevin, respectively) are effective in reducing earwig population densities and fruit injury.

A UAES project shows tree growth with legume alleyways, weed fabric and tillage was greater than in straw and living mulch with grass matching the conventional check. Available soil N was greater under legume and tillage, soil quality was best in legume treatments, while tree roots were more abundant in legume alleyways than grass. The straw mulch treatment with grass alleyway used the least water.

There is a considerable benefit in terms of yield to incorporating alfalfa in organic vegetable rotations due to the additional nitrogen supplied. Yield in potatoes was significantly greater with manure as fertilizer as opposed to compost. This effect was not seen in other crops. This is likely related to nitrogen release

dynamics and differences in peak demand between different crops. Legumes sown in the alleyways of establishing organic peach trees significantly improve tree growth and soil quality. After four years trees were larger when grown with legumes in the alleyway than tillage and fabric mulch controls despite considerable weed pressure. Tree roots were found to be significantly more abundant under legumes than grass indicating trees grown with legume alleyways had access to a larger nutrient pool and were therefore less susceptible to competition from weeds in the tree row.

Irrigation

Many farmers in western Emery County have converted from furrow to sprinkler irrigation in the past five years. As a condition of receiving Federal funding, farmers must certify they are operating and maintaining sprinklers properly. There is a need to teach farmers how to use these new systems. Over 80 persons received training in sprinkler management as a requirement of their participation in the Colorado River Salinity Program. Every participant has been able to certify they are operating their sprinklers correctly. As a result, over 150,000 tons of salt (estimated) have been removed from the Colorado River each year. Most participants report water savings of 40 to 50% and alfalfa yield increases of 30 to 40% as a result of better irrigation management. In Uintah and Daggett Counties farmers improved profitability by $33.55 per acre for a total impact of $129,771 using correct irrigation.

Crops

Efficient production of field crops and forages is essential to maintaining the economic viability of Utah's agricultural operations. Over the past few decades, agricultural producers in Utah and across the U.S. have faced unprecedented opportunities and challenges. Advances in science and technology have enabled growers to increase the productivity and/or efficiency of their farming operations. USU generates the information necessary for Utah agricultural producers to make management decisions to optimize crop inputs on their operations and to further the scientific knowledge base on managing crop inputs in the Intermountain West.

Outcomes of the research are primarily cultivars are released and made available to producers. These released cultivars such as Greenville this year result in a change in the planting decisions for these stakeholders. Greenville was released as a replacement for Garland and appears to be significantly changing the quality of irrigated bread wheat grown in Utah and Idaho. Acceptance of the newest rain-fed release, Curlew, appears to be growing. Continuing increase in utilization of Lucin CL is changing weed management in rain-fed wheat production in Utah. Utah's milling and baking industry utilizes Utah cultivars extensively in their mill stock. Curlew, the most recent public domain release yielded approximately 3.0 bushels per acre higher than Deloris in 2012 production. For 100,000 acres, and December wheat prices ($9.17/bu.), the increase in yield would be valued at $2.8 million. The highest average yield for a released wheat cultivar was 118.5 bu/acre for Xena, though the average yield for Golden Eye and Aquila were not statistically different at 117.7 and 116.5 bu/acre respectively.

In the winter barley program, the breeding line UTWB10201-15 reported the highest average yield of 194.9 bu/ac was 30.1 bu/ac higher than UTWB9703-19, which is a release candidate. UTWB9703-19 has the pedigree Kold/86AB474 and we have planted breeders' seed for this line.

The most recent release from the spring barley program, Goldeneye, yielded 13.7 bushels per acre higher than the commonly grown cultivar Steptoe under irrigated production in 2012. This increase in yield for 28,000 acres (2012 harvested acres for Utah) at December's price of $6.60 per bushel would be valued at $2.5 million dollars.

UAES research has found combining the new fungicide (K20) with widely used commercial but less effective fungicides greatly increased their antifungal killing powers. For example, mixing small amounts of K20 with the widely used crop fungicide ENHANCE® (manufactured by BASF) lowered the amount needed to kill serious crop disease fungi 16 times. Similar degrees of increasing fungal killing powers have been seen with other commercial crop fungicides. The synergism observed between K20 and today's most widely used crop fungicides has broad and important implications. It offers the possibility of using dramatically smaller amounts for crop protection - which will counter the increases in global fungal resistance and reverse the rise in human and animal health problems attributed to them. Finally, the synergistic antifungal effect has been observed between K20 and medically used antifungal agents opening the way for possible new antifungal strategies against human and animal fungal diseases in

addition in crop protection.

Sheep

USU Extension is involved with livestock pooling to increase incomes of ranchers in Utah. The Summit County Lamb Pool shipped 361 lambs and 14 farm flock owners received approximately $1500.00 additional income compared to selling them at a traditional auction. In Uintah County producers received $10,091 for wool would probably have been hauled to the landfill without the wool pool. UAES research shows supplementing the diets for forage-fed lambs with flaxseed treated to reduce hydrogenation by alpha-linoleic acid by ruminal microbes can increase the muscle content of omega 3 fatty acids. Addition of saponins and tannins to the diet of lambs for two weeks can affect meat volatiles and the fatty acid composition long after they are returned to a traditional diet. Overall these data will contribute to the body of knowledge existing on the relationship between an animal's diet and the subsequent product composition and quality

UAES researchers learned parasitized sheep consuming food in confinement or grazing legumes (sainfoin) with antiparasitic secondary compounds (tannins) are able to self-medicate. Ingestion of tannins reduced fecal egg counts, an indirect estimate of parasitic burdens. This has important implications for managing grazing animals as reliance on chemotherapy can be reduced while enhancing the health and nutrition of ruminants grazing diverse pastures. Results from another UAES project show lambs learn about the negative effects of ruminal distension and learn to prefer feeds associated with relief from distension. It may be possible to train animals to regulate the incidence of bloat by giving them access to tannin-containing plants. This has significant implications as bloat costs livestock producers as much as 100 million dollars/year in the U.S. Even with slight distension, cattle lose three-tenths of a pound of gain/day. Other findings from this project suggest mother influences the ability of offspring to self-medicate. This is of relevance for creating innovative management approaches to enhance self-medication in animals.

Beef

BQA is a national, industry motivated program sponsored by the National Cattleman's Beef Association (NCBA). Beef Quality Assurance is a national program provides guidelines for beef cattle production. The program raises consumer confidence through offering proper management techniques and a commitment to quality within every segment of the beef industry. Producers are better able to provide a product suited for the wholesale and retail trade after taking this workshop. This workshop combines the classroom with demonstration and hands-on training. Beef producers leave this workshop having gained a tremendous amount of information is directly relevant to their farms and ranches. Approximately 275 participants have taken the workshop coming from Utah, Wyoming, Idaho, Montana, Colorado and Nevada. Thirteen Utah beef producers became BQA certified in 2012 using the utahbqua.com website.

A UAES project conducted research examining the global competitiveness of U. S. beef and the results suggest traceability is a valuable characteristic by itself, but other characteristics can be verified with traceable systems, such as added food safety and animal welfare characteristics, are even more valuable than traceability alone. Research under this project also revealed U. S. traceability and tracking systems are less well developed than in other countries. This could contribute to a lessening of competitiveness for U. S. beef products as competitors are able to deliver tracking systems providing more information in a timelier manner than the U. S. system. Essentially, the project revealed U. S. beef marketing systems will need to evolve to maintain competitiveness in international markets.

NIFA funded scientists at Utah State University found cattle grazing a choice between strips of tall fescue and tannin-containing sainfoin [SAN] or saponin-containing alfalfa [ALF], incorporated tall fescue into their diets (~30%) even when legumes of greater quality were available ad libitum. Animals grazed more sainfoin than alfalfa, and intake of tall fescue was greater in the ALF than in the SAN treatment. No differences in average daily gains were detected between the two groups of cattle (~1 Kg/day). Beef carcasses were lean (50% select, 38% standard, 12% choice quality grade). Samples were very well liked in a taste panel, with preliminary results suggesting a trend for greater texture and juiciness scores for animals under SAN. Results of this research will help producers develop plant mixtures build soil, reduce dependence of plants on fertilizers, herbicides, and pesticides, promote the nutrition and health of

herbivores with lower reliance on antibiotics and anthelmintics, and enhanced meat quality and consumer acceptance.

Over 5000 calves were shipped from the Summit County Stockyards this past year where approximately 75% were sold by pooling them together as calf marketing pools. Several years ago extension helped organize some of the larger calf pools. The Summit County Food Coalition organized a program where local raised grass feed beef was sold to local grocery stores, restaurants and individuals in Park City. This group obtained a $25,000 grant/no interest loan from Summit County to promote this program. Two local ranchers involved with this program received an additional $.20/lb. live weight compared to selling their calves over the traditional livestock video auction, resulting in $7420.50 additional income.

Dairy

Feeding brown midrib (BMR) corn silage in high forage diet with a high concentration of good quality alfalfa hay maintained higher body weight after parturition even though feed intake was similar through peak lactation. Cows fed the BMR silage produced 1.7 kg/d more milk compared to those fed conventional corn silage, and therefore throughout total experimental period for 180 days, BMR silage fed dairy cows produced 306 kg more milk. Decreased urinary N:fecal N due to feeding BMR silage and/or quality of alfalfa hay highlights a great opportunity to improve efficiency of N utilization for dairy production by selecting forage crops use N more efficiently. Feeding forages higher in ruminal degradability such as BMR had better N utilization as evidenced by decreased concentrations of BUN, MUN, and urinary urea N, which can represent an environmental advantage over traditional sources of forages in lactation dairy diets.

Overall, individual Farmers/Ranchers who implemented operational changes (suggested by SARE research/education grants) increased their net income per farm per year by $6,000 to $30,000. The yearly dollar impact ratio, calculated using total contracted grants per state/protectorate is now over 21.1, impacting 50.33 million acres of total 279.76 million farm/ranch acres in the Western Region (this estimate based on data in the WSU-SESRC reports).

CLIMATE CHANGE AND NATURAL RESOURCE USE

Water Conservation

Shrinking water resources in Utah and the nation have brought conservation efforts to the fore. USU Education of clientele groups to achieve water conservation is necessary to ensure adequate water supplies for the future. Improved evapotranspiration estimates of large irrigated areas using remote sensing techniques will lead to a more efficient use of water resources and better management of river systems such as the Colorado and Bear Rivers where significant diversions for irrigation occur. Our research has shown better estimates of soil water content can be obtained using the hybrid ET methodology which combines results from remote sensing models for better estimates of spatial ET and ultimately irrigation water demands.

Rangeland

Managers, agents, land users, and the general public seek information, expertise and assistance in many areas related to public and private rangelands and associated natural resources. A list of research and extension work within USU includes the following: range management and improvement techniques, rangeland productivity, grazing management, animal nutrition and supplementation, range condition and trend, measurement techniques, identification and characteristics of native and introduced plants, invasive species management, poisonous plants, fire, riparian management, wildlife-livestock interactions, coordinated resource management, additional sources of technical assistance and information, rangeland rehabilitation, and current issues on rangeland character and use arise. In addition, extension agents, specialists and administrators are provided specific information and assistance with issues related to rangeland resources, including management, capabilities, values and uses.

Maps showing the distribution and properties of soil are needed for sound land use planning and management, although many federal public lands in the western USA still lack initial or have only very coarse resolution soil maps. The digital soil mapping research in a UAES project is advancing the rate at which soil survey data can be produced on federally administered public lands in Utah and the western

USA, and the rate at which value-added soil information can be derived for emerging land use issues.

Information generated by a UAES project is communicated to private land owners, public land managers, and professional peers. Two county weed supervisors applied several of the concepts to management within their respective counties. The adoption of preventative strategies to weed management has been estimated to provide $17 of return on investment for every dollar spent on prevention.

Cheatgrass invasion has degraded millions of acres of rangelands in the western US. This exotic annual grass increases erosion, reduces forage production for livestock and wildlife, and drastically increases the frequency of wildfire. It is also highly persistent, forming dense monocultures are difficult to convert back to native perennial species. NIFA and AES-funded researchers at Utah State University have shown one reason cheatgrass is so persistent is it modifies soil nutrient cycling and soil microbial populations in ways promote cheatgrass success. Cheatgrass stimulates nitrogen (N) cycling and plant N availability by producing plant litter degrades rapidly, releasing organically-bound N. The fast growing cheatgrass plants are better able to exploit this increased resource than the slower-growing native species. Researchers at USU have also shown cheatgrass benefits from thinner winter-time snowpack thicknesses, although this effect appears unrelated to increased nutrient availability. This finding indicates global warming and the associated reduction in snowpack thickness has the potential to increase rates of cheatgrass invasion in the western US.

Of the manipulation treatments applied in 2009 (prescribed fire and imazapic herbicide application, alone and in combination) and evaluated in 2010, the fire/herbicide treatment had the greatest impact in reducing cheatgrass cover (17% compared to 40% for control), density (600 plants/m2 compared to 2,250 plants/m2 for control), biomass (19 g/m2 compared to 50 g/m2 for control) and seed bank density (6,000 seeds/m2 compared to 27,000 seeds/m2 for control). The fire/herbicide treatment also had the greatest impact in promoting the establishment of seeded species (17 plants/m2 compared to 6 plants/m2 for control. The costs for the treatments were: prescribed burning at $33.95/ha, imazapic herbicide treatment at $61.08/ha, and drill seeding the grass/forb mix at $79.12/ha. Due to logistical constraints, the prescribed burn and herbicide treatments were implemented later in the season than planned, reducing their suppressive effects on cheatgrass.

Tall fescue is the primary grass growing on more than 14 million ha of pasture- and hay-land in the United States. Most tall fescue is endophyte-infected, and the negative impact of tall fescue alkaloids on beef production places the total livestock-related losses at $500 million to $1 billion a year. UAES researchers have shown cattle and sheep grazing a choice of diverse forages with diverse secondary compounds: Fescue and reeds canarygrass (alkaloid-containing grasses); sainfoin and birdsfoot-trefoil (tannin-containing legumes); alfalfa (saponin-containing legume) are able to select a diverse diet as a function of the type forage on offer and on the type of plant secondary compound ingested. They also found animals incorporate potentially beneficial secondary compounds into their diets (tannins, saponins), as well as forages of lower nutritional value (e.g., tall fescue) than legumes, even when legumes were available ad libitum. The sequence in which forages were consumed by cattle was of relevance, with greater utilization of endophyte-infected tall fescue when legumes were ingested first in the sequence. Tannins and saponins added to supplements or present in legumes enhanced utilization of alkaloids added to feeds or present in endophyte-infected tall fescue by cattle and sheep. This is a significant finding as approximately 90% of tall fescue pastures in the United States are estimated to be endophyte-infected with alkaloids negatively impact intake, health and performance in grazing animals. Cattle reached finish body weight at pasture and meat quality analyses revealed high proportions of polyunsaturated fatty acids and taste panels showed high liking scores. Results of this research will help producers develop plant mixtures build soil, reduce dependence of plants on fertilizers, herbicides, and pesticides, promote the nutrition and health of herbivores with lower reliance on antibiotics and anthelmintics, and enhanced meat quality and consumer acceptance.

Water Wise Landscape Education

According to the U.S. Environmental Protection Agency, 30-60% of urban fresh water is used in the landscape. Fifty percent of applied water is lost due to run off and evaporation associated with inefficient irrigation systems. The Water Conservation District and the USEC assists Utah residents through the

education of water conservation principles in the landscape. These efforts are accomplished using a variety of education media and tools including public workshops, web-based content, newspaper, radio, television, demonstration gardens, and incentive programs. By using plants more adapted to Utah's desert climate, water used in landscapes is drastically reduced and yards and gardens improved in both appearance and health. Utah, like much of the Intermountain West, is an urban state and turfgrass is the largest component of most urban landscapes. USU is working to develop grasses and mixtures of grasses for these landscapes can remain green and offer a safe surface for recreation while saving up to 50% of the water currently needed for turfgrass areas. For a 5000 sq. ft. lawn this equates to a savings of almost 39,000 gallons per year. For the traditionally used species, management tailored to the Intermountain West will reduce the amount of pesticides applied, up to an estimated 30%, as well as 10-25% in water savings.

A UAES study showed plant canopy cover-rather than plant material water use categorization-was the controlling factor in woody plant and perennial water use. This suggests categorizing landscape water use based on plant type, as suggested by the EPA (EPA Water Sense, 2009) appears to have no merit. Consequently, landscape managers may achieve meaningful water savings by simply adjusting landscape-planting densities. In the meantime, adjusting the percentages of landscaped area devoted to woody plants, turf and perennials may provide another method for conserving water in landscapes under well-watered conditions.

UAES reported techniques for optimizing water management are helping others as they develop strategies for best using water throughout the world. UAES research in urban water consumption by landscapes has resulted in a method allows the identification of high-end users, allowing municipalities to target these users for leaks and/or sprinkler checks and education, improving the overall efficiency of water use and delaying or avoiding the need for large new investments in water transmission structures. Evaluations concerning 60% of the water Salt Lake City Corporation (SLCC), delivers to 400,000 daytime users, indicates it is of legally adequate quality, and SLCC does not need to change management. Peruvian national planners for the 9 million residents of the Lima-Callao metropolitan area better understand data needs for accurately predicting contamination threats to water supply. The US State Department and national planners for Jordan's 6,000,000 residents have accepted projections concerning when and where it will be too expensive to irrigate with groundwater. The energy provider for the 45 million residents of Colombia accepted the report identifying candidate wells locations. Because woodland management is contentious, with some groups arguing for removal of most trees and others advocating preservation of all, reliable information on natural recruitment and mortality across a range of climatic conditions is critical.

Wildlife Conservation and Management Outreach Education

There can be substantial economic and social benefits associated with wildlife-related recreation. Much of the high quality wildlife-related recreation is associated with privately-owned lands. In the U.S., 2.1 million farmers and ranchers control more than 60 percent of the land base. As such, public wildlife inhabits, and is dependent upon, the habitat resources found on private land. Most stakeholders have little economic incentive to manage their land for wildlife. Although public and private wildlife management agencies and organizations have implemented programs to encourage landowners and other stakeholders to manage for wildlife and/or allow public hunting or recreational access, lack of coordination between management agencies and stakeholder concerns about damage caused by wildlife and wildlife users have reduced overall program effectiveness. To address these issues in Utah UCES facilitated the establishment of the Cooperative Wildlife Management Program Unit (CWMU) and a business association to address the needs of participants. The Association consists of over 200 farm and ranch operations encompassing over 2.0 million acres of private rangeland in Utah. The Association has saved Utah landowners over $4.5 million. Annually, the CWMU program generates over $20 million in new revenue for Utah landowners and provides free access to over 4,000 Utah hunters to high quality big game hunting opportunities.

An array of silvicultural practices can be used to accomplish a wide range of management objectives such as producing wood, creating wildlife habitat, and enhancing recreational opportunities. The most widely applicable silvicultural practice is thinning. Thinning to reduce relative density is often the most

efficient and effective silviculture practice to achieve many stand management objectives. Density management diagrams (DMD) are simple graphical models of even-aged stand dynamics. UAES researchers created a density management diagram (DMD) for even-aged mixed-conifer stands in the Sierra Nevada Mountains. Development of a longleaf pine DMD resulted in recommendations for designing silvicultural treatments intended to create and maintain stand structure desirable for the endangered red-cockade woodpecker. The approach has multiple advantages, including explicit links between goals, management approaches, and outcomes; efficient development of alternative means of accomplishing the goals; and effective communication of potential tradeoffs between both objectives and alternatives. A DMD constructed for ponderosa pine stands was accompanied by recommendations for developing silvicultural strategies intended to benefit northern goshawk, a Utah sensitive species.

Natural Resource Management

The current unprecedented outbreak of the native mountain pine beetle covers over 9 million acres in the western U.S. A UAES project developed a linear approximation technique based on techniques used in macroeconomics. They created a model of mountain pine beetle spread over a heterogeneous forest of up to 200 different forest managers. Forest managers choose harvest levels to balance timber and non-timber services from the forest and look across the forest to adjust harvest activity in anticipation of a spreading outbreak. Results of this theoretical model show timber harvesting can lessen the severity of a mountain pine beetle outbreak. The spatially explicit model indicates this decreased severity is accompanied by a more rapid spread of beetles across the forest. As a result, forest managers are presented with a tradeoff between outbreak severity and coverage. This insight will prove useful for public forest management which has traditionally responded to insect outbreaks with increased harvesting.

In US forage systems these non-native weeds induce over $1 billion in lost revenue and management costs annually and weeds in cultivated areas induce over $20 billion annually. UAES researchers developed a technique was designed to decrease positive interactions between non-native weedy plants and soil organisms and at the same time decrease negative interactions between native and forage species and soil organisms. Specifically, by adding activated carbon (AC) to soils, we have found we can limit plant-microbe communication, decrease weed growth and increase native forage plant growth in the greenhouse and in sites in central Washington State. This technique involves the costly application of high concentrations of AC. We are now trying new application techniques and lower concentrations in WA and in UT to determine the most cost-effective application rate and if results are consistent across years and sites throughout the intermountain western US. We have found AC treatment is effective at concentrations of 1% mass in the top 10 cm of soil or roughly 1 kg m-2. This translates to a cost of almost $15,000 ha-1. We are currently testing concentrations of 100 g m-2. If successful this lower concentration would entail costs of $1,500 ha-1 or $600 acre-1.

National Park Service Visitor Management

A UAES project developed new field assessment methodologies more sensitive to issues of spatial scale, and advancing techniques incorporating the latest in GPS, GIS and computer image analysis. This advancement has improved accuracy by removing observer bias and increasing field efficiency, thus saving staff time and park financial resources. An important outcome of this work is the resulting annual financial savings to the parks which in the case of Kenai Fjords NP and Glacier Bay National Park, estimated to be approximately $15,000-$20,000 per year for several years. Research was conducted in Kenai Fjords National Park, Denali National Park, Joshua Tree National Park and Rocky Mountain National Park. From this work, an overall conclusion is visitor knowledge of local ecological issues and knowledge of Leave No Trace practices are an important component of sustainable visitor management. These findings continue to result in changes National Park Service visitor management actions to include ecological knowledge education in order to more sustainably manage resource conditions. The project developed and improved visitor site assessment methods which have resulted in the ability of land managers to improve resource conditions. This approach has resulted in changes in visitor management actions due to improved knowledge of resource conditions.

RENEWABLE ENERGY

Alternative Energy Production

There is a lot of fluctuation in energy prices and a lot of interest in alternative fuels including wind, geothermal, methanol, biofuels, and ethanol type products. UAES research and UCES provides opportunities for farmers to look at raising other types of crops might be used as alternate fuels. There are companies interested in having farmers in Beaver County get involved in wind production, geothermal raising grasses to use in fuel production and the development of woody biomass for energy. UCES works with producers to help them determine if these alternative products will help them make more money for their operations.

The Induced Bed Reactor (IBR) anaerobic digester has been installed in the United States, China, Canada and India. UAES research showed anaerobic digestion can be a source of additional income for a family farm including sale of renewable energy and treated bio-solids from manure produced and has an advantage over many current anaerobic digesters because no energy input was needed in IBR's for mixing. The IBR can operate at moderate temperatures and temperatures high enough to kill pathogens. This means the IBR is appropriate for treating solids found in municipal waste where pathogen kill is important. Energy in the form of biogas which is similar to natural gas can be made from food processing waste, grocery waste, bakery waste, byproducts from soft cheese and yogurt manufacture. It is more efficient at treating agricultural and municipal waste than commonly used complete mix anaerobic digesters. The IBR can be effectively used to produce renewable hydrogen from food waste using dark fermentation. The effluent of the H2 process can be digested into methane. The energy equivalent of both H2 and CH4 is greater than energy provided by digesting food waste to produce solely CH4. This past year was the first known time high quality synthetic diesel was made from manure.

One UAES project examines the physical and economic feasibility of 5% biomass co-firing in the coal-fired power plants of Utah. Transportation models are used to find out the physical feasibility of 5% biomass co-firing, as well as locate the supply zone for each power plant would minimize the transportation cost. Additional cost required for 5% biomass co-firing and the economic benefits associated with biomass co-firing are calculated to be $34.84 million. Previous studies on CO2 emission reduction from biomass co-firing are used to compute the economic benefit from selling carbon credits in the carbon trading market. Based on 2010 emission record in Utah, 5% biomass co-firing brings the annual economic benefit of $11.37~$34.10 million assuming $16/ton of CO2 in the emission trading market. The regression model is used to find the relationship between particulate matter (PM) emission and the human health damage. The regression results show decreases in 1% of PM emission improves the human health (in U.S.) by 0.65%~0.67% in value. It might generate annual economic benefits of $6.72~$9.93 million in Utah. Altogether, the economic benefit from 5% biomass co-firing is estimated to be $38.55 million which is higher than the additional cost of biomass co-firing to generate electricity ($34.84 million). The benefit cost ratio is calculated as 1.107. Five percent biomass co-firing is economically feasible when benefits from all the positive externalities are included. The LP-SAM model is used to estimate the impact of wildfire in southeast Oregon.

CHILDHOOD OBESITY, NUTRITION, AND COMMUNITY SUSTAINABILITY

Food Sense

Food $ense is Utah's Supplemental Nutrition Assistant Program - Education (SNAPEd). In Fiscal Year 2012 the program reached over 13,202 adult participants and 17,111 youth participants. Participants provide information on their personal demographics, their intent to change behavior after participating classes and their behavior change (after a series of lessons). Through self-reported post/pre behavior questionnaires, SNAPEd low-income individuals show increased intent to follow food safety practices by properly cooking, chilling, and separating food items, and properly cleaning food preparation surfaces through consistent nutrition education of four or more lessons.

A UAES study followed up with some of the participants in Food $ense. It was assumed 60 teachers, 4 administrators, and approximately 1500 children and their families increased their awareness and knowledge of the importance of eating a variety of fruits and vegetables for health and wellness after participating in the Food Dudes program in 2011-2012. Children attending elementary school at the four schools who received full or partial Food Dudes programs ate approximately 22% more total fruit and vegetable after the 16-day implementation phase of the program. This was significantly more than the

amount of total fruit and vegetable eaten by children in the control school ($p<0.01$). This change in intake was not maintained over the 3 month follow-up period. The Food Dudes program does not appear to result in lasting changes to fruit and vegetable intake among children in U.S. schools.

Manufacturing Extension Program

This program was developed to assist Utah's small manufacturers to learn and acquire new technologies and processes to help them become more competitive. The manufacturing sector plays a major role in Utah's economy. Small and medium sized manufacturers confront major problems in responding to increasing global competition. These problems encompass a broad range of issues, only some of which relate directly to technology. Inadequate resources - people, money, expertise, information, and insufficient time are reasons many small industrial firms are not improving their manufacturing performance. The Manufacturing Extension Program is currently ranked number 2 nationally for Economic Impact on Manufacturers. In Utah 83 of 89 companies reported impacts including a total bottom line impact of $85,934,039, a total investment impact of $49,401,440. There were 1,329 jobs created or retained through the efforts of MEP.

Forage Marketing and Dairy Relocation Program

Dairies have relocated to Utah from the 'Bring the Cows to the Feed' program are 19.8% of Utah's dairy industry. Since the early 1990's, 11 dairies have 'mooo-ved' to Utah as a direct result of this Extension program. They produce about 339,648,600 lbs. of milk valued at $40,757,868 annually. These dairies hold an estimated 17,000 cows valued at approximately $25,500,000. They have provided hundreds of millions of dollars in 'direct' economic impact and ongoing 'indirect' activity. Created 1,700 jobs and provide a very, significant market for Utah grown forages and grains.

Afterschool Programs and Education Research

Many youth find themselves unsupervised during the afterschool hours when many youth engage in less appropriate behaviors. USU Extension through grant funds has established 4-H afterschool programs. Youth in these programs gain life skills through participation and also have a safe and educational place to be during the unsupervised hours.

UAES economics research is designed to help policy makers better understand the implications of using value-added models to estimate teacher quality effects. It shows commonly used statistical models of teacher quality may be biased because students are not randomly assigned to classrooms. There is strong evidence student assignment to classrooms is likely based on characteristics which are normally unobserved. The results of this research show value-added (and similar) statistical models should be used cautiously. If students are assigned to classes based on characteristics are unobserved or difficult to control for, as suggested by this research, statistical inferences regarding teacher quality, class size effects, and other important educational metrics may be unreliable or misleading. This research can therefore help improve education outcomes at the school and district level.

Building and Maintaining Healthy Relationships

UCES implemented the Northern Utah Marriage Celebration providing research based information to individuals and couples. Information to promote family well-being was disseminated through presentations, e-mail, phone calls, publications or other written materials as requested. The adults who attended the classes demonstrated statistically significant increases in knowledge and skills related to healthy relationships. Participants also experienced statistically significant increases in relationship stability and satisfaction. Overall, participants reported remarriage and stepfamily education classes were very helpful. In the qualitative interviews, participants reported various benefits for their couple relationship, family relationships, and with their children.

One UAES project has provided new insight into the early years of remarriage. It has identified specific difficulties in social, spousal, parenting, and step-parenting domains. Findings highlight the longitudinal perceptions of men and women on difficult areas of remarried and stepfamily life. The majority of significant items within this study had a positive trend, meaning couples reported increased difficulties over time. This study points to underlying and on-going challenges for remarried couples. For men, the most significant difficulty over time was being a biological parent in a stepfamily; whereas women reported having the most significant difficulty with their roles as a spouse and stepmother. The results suggest men and women have more differences than similarities in reported re-marital and stepfamily difficulties. It is

not entirely clear whether these findings are the result of time alone, sample characteristics, or the relationship dynamics within the homes; this research can serve as a catalyst to explore these difficulties in more detail.

Community Development

UCES works with local leaders to develop a diversified economic base that will help provide a sustainable community and let residents know what resources are available to them. UAES research on natural gas vehicles is directly applicable to the planning decisions of state departments of transportation. This research finds the proportion of the passenger vehicle fleet is likely to adopt CNG vehicles is small even if technology improvements allow for very low conversion costs or manufacturer vehicle price differentials. We also find even at current prices, a non-negligible proportion of the vehicle fleet is predicted to adopt CNG. CNG vehicles make sense for consumers who drive many miles and are willing to live with the inconveniences associated with CNG vehicles. Our research suggests CNG is most likely to be cost effective for high mileage, low MPG vehicles like service truck, buses, and deliver vehicles. Moreover, these vehicles are also less likely to be negatively affected by the inconvenience of more frequent refueling.

Research supported in part by the UAES has now provided preliminary evidence demonstrating particulate pollution poses a significant public health risk, as indicated by PM-related changes in respiratory parameters in healthy individuals. Results of this project will have relevance to the potential impacts of PM pollution on the health of millions of people. Since our data indicates CVPM strongly induces the release of C-reactive protein, an important clinical indicator of impending or recent cardiovascular insult, this putative biomarker may be adopted as a useful "red flag" signaling exposure to CVPM and similar PM pose serious adverse health effects.

UAES research has contributed understanding the factors shape migration flows to Intermountain West and the dynamics of employer-based investments in this region. Contrary to previous research, factors beyond amenity richness, such as growing economic investments, expansion of service sector industries, and county diversity motivated migration to the region while tax incentives, access to low wage skilled labor, and county diversity motivated employer investment in and relocation to the region. This research also contributes to theory and research in migration. Contrary to expectations, race shapes migration to this region in important ways. While education is the primary factor driving migration generally, destination choice is shaped by the interaction between race, social networks and employment context. As a result, whites from the Rust Belt are much more likely to migrate west while blacks are more likely to migrate south. This research contributes greater understanding of factors shape recruitment and hiring practices among employers in the region. This knowledge will inform policy makers, employers and community agents on cultural, structural and demographic factors are re-shaping the region.

The Intermountain West is the fastest growing region in the United States. Planners and land use policy experts in the region frequently assume 'smart growth'-like programs are required to protect farmland and farming businesses from pressures associated with population growth and urban sprawl. These policies are almost all designed to promote development in clustered, higher density locations - ideally located close to urban areas. Having better evidence smart growth policies have demonstrated benefits for local farmers can be important to shifting local discussions about property rights vs. public benefits. UAES results found more clustered patterns of rural housing development are indeed linked to reduced rates of farmland loss and more robust gains in sales of farm products. Specifically, greater density of 'patches' of development in rural areas was significantly associated with lower rates of loss of farm numbers and farmland and cropland acres. Moreover, every 10% increase in the percent of a county's population growth located outside of urban boundaries was linked to a 2% drop in farm sales. This provides important evidence efforts to utilize local land use ordinances to shape the location, density, and clustering of rural residential housing can have a measurable benefit for the farm sector.

Finance

Extension is an integral part of many programs designed especially for low and moderate income families. Programs include Volunteer Income Tax Assistance and the Earned Income Tax Credit; Utah Saves; Home Buyer Education and Individual Development Accounts as well as additional development of the PowerPay debt management and financial education website. The Smart Money Moves/ IDA

Program in Cache County had a total of 172 IDA accounts for the matched-savings program. Since the program's beginning in Cache County, there have been 15 homebuyers who had IDA matched-savings to help them purchase their first home bringing in a total of over $2,000,000 to the Cache County economy. In addition, nearly $200,000 dollars has been sent to USU to help cover tuition for IDA savers. In the third quarter of 2012 alone, there were three small businesses started up in Cache County as a result of the IDA program. UAES research results show more frequent parent-child discussions about personal finances increases the likelihood of respondents planning their spending and having written financial goals. Practicing recommended financial management behaviors and a low level of anxiety are related to regular saving. Low to moderate income consumers who save regularly are more likely to have life insurance. Economic factors affecting the likelihood of having a saving account include age and using recommended financial practices. Education, gross income, and net worth increase the likelihood of having both a savings account and an investment account. Low to moderate income consumers who use more information sources to make financial decisions are more likely to save.

During the 2012 tax season, taxpayers in six rural counties received Volunteer Income Tax Assistance via the Virtual VITA delivery model and the support of their local Extension office. In total the filers received $186,256 in federal refunds including more than $70,000 in Earned Income Tax Credits (EITC). The EITC is the largest anti-poverty program in the country. Additionally the filers received more than $26,000 in state tax refunds. It is estimated the taxpayers saved $28,000 in tax preparation fees.

Business, Entrepreneurship, and Rural Economic Development

The Extension Entrepreneurship and Business Development Initiative - County Team was trained and certified in NxLevel Entrepreneurship and Cashing in on Business, Home Based Business and E-Commerce Curricula. The Best Practice Team planned, organized, and facilitated county-wide economic development conferences in Garfield, Box Elder and Carbon Counties as well as state-wide Diversified Agriculture Conference held in Sanpete County. County Educators planned, organized and conducted entrepreneurial training for women, youth and community entrepreneurs in Weber, Duchesne and Emery Counties. The Garfield County Educator developed "Business Outreach Station" with Business Outreach Support Services (BOSS) Toolkit utilizing StartSmart business outreach materials which included checklists and self-assessment tools for start-up business ventures. The Best Practice Team trained Native American, Latino and other ethnic chambers of commerce in the facilitation and use of the BOSS Toolkit. BOSS was distributed to Extension staff statewide through regional staff meetings and to regional SBDC and BRC offices, chambers of commerce, and local economic development offices, SCORE counselors and other partners. Small Business Development Center offices at Logan, Tooele, Brigham City, Vernal, Price and Blanding provided long term one-on-one counseling to 621 clients. An additional 846 short term clients were assisted and 833 participants received training in 41 programs. Topics included business plan development, marketing and advertising, financial management, franchising, and managing human resources. Through UAES and UCES efforts 178 jobs were created, 90 existing jobs were retained and there were 72 new business start-ups. Clients reported $2,850,000 in increased sales and $4,340,000 in total capital formation including owners' injection of funds, shares sold and USDA Value Added Producer Grants. USEC continued ongoing support of National eXtension Entrepreneurs and Their Communities COP Team and assisted with FAQs and Information Briefs for the website. USEC also assisted on national USDA Rural Development "Stronger Economies Together" curriculum design team, trained participants at national and regional training programs, and continued the Extension Sustainable Living Initiative by launching a website with 18 participating extension faculty.

A UAES research project finding found both rural development "opportunities" and "threats" associated with the siting of utility-scale renewable energy facilities. Rural development "opportunities" linked to such facilities fall into three primary categories: job creation, the creation of major new sources of tax revenue for local governments, and high levels of local government flexibility in regard to the use of such newly-generated revenues due to limited public service or infrastructure demands associated with large renewable energy facilities. "Threats" identified in the research include public concerns about adverse environmental effects, intrusion of facilities into socially-valued spaces and places and potential exclusion of some uses in areas where renewable projects are built, disappointment over limited employment opportunities for local residents, a decline over time in tax revenue flows due to depreciation

of the capital facilities installed as part of renewable energy projects, and uncertainties regarding longer-term revenue generation projects from such facilities.

Nutrition

The health and well-being of American families are influenced by the ability to consume a nutritionally adequate diet. Understanding how the body recognizes and responds to nutrients is critically important information and has implications for dietary selection, the control of food intake and numerous nutrition-related disorders. UAES researchers conducted experiments to elucidate the pathways that are involved in the recognition of nutrients, including fat, carbohydrate and salt. Overindulgence in any of these nutrients has been shown to have deleterious health outcomes - thus, it is important these receptive pathways are characterized in order to have better, empirically-based strategies to help curb the overindulgence of specific nutrients from both food design and pharmaceutical approaches. Researchers made several seminal findings related to how fats, sweets, and salts are recognized by the gustatory system which has added to the overall understanding of nutrient receptors and the pathways that contribute to their recognition. This data may help in the development of approaches may systematically be involved in the reduction of food intake and help in the battle against the epidemic of obesity. The work performed suggests strongly these chemosensory pathways are important contributors to the control of food intake. Overindulgence in specific nutrients leads to a decrease responsiveness of these pathways which, in turn, further leads to increases in subsequent intake in order to receive the same pleasure from eating. The outcome of this research is consistent with the recommendations a well-balanced diet limits intake of fats and carbohydrates will maintain normal functioning in chemosensory pathways devoted to the control of food intake.

Family Well Being

The strength of a society lies in the strength of its families. With the pressures of today many families are struggling--grandparents raising grandkids, single moms, balancing work and family, caregiving for aging parents, financial pressures, etc. all seem to be on the rise. An understanding of the social, cognitive, emotional, and physical development of individuals and families is imperative to the function of these families over the life cycle. UAES substantiated previous work child care quality continues to be lower in rural child care programs than in urban programs. For the first time in the child care literature, we documented rural programs are especially low in the quality of work climate for staff and in the quality of communications with parents. Many rural programs, for example, had no parent newsletter, rarely held parent conferences, and didn't have a system for parent communications. On the positive side, rural programs had lower staff turnover than urban programs, perhaps because jobs are scarcer in rural than urban areas.

Obesity

Concern over increased obesity and poor nutrition has come to the health forefront in the United States within the last few years. Outcomes have emerged from UAES research indicates associations between obesity and mortality grow stronger with age when birth cohort membership and survey selection biases are taken into consideration. This is contrary to some previous work suggesting elevated BMI might be protective at later ages. Second (and related to the previous point), UAES researchers found obesity accounts for a larger proportion of U.S. mortality than indicated by some recent studies have not accounted for health variability among U.S. birth cohorts. Third, this program of research has revealed short sleep duration encourages poor food choices and elevated BMI among U.S. adolescents. Although prior research has found sleep-BMI associations, we have extended those findings - showing they are much more pronounced among non-Hispanic white, non-Hispanic Asian and Asian girls than other groups of adolescents.

Iron is an absolute requirement for life; it is involved in several biochemical reactions ranging from cell respiration to DNA synthesis dietary iron deficiency is the most common mineral deficiency affecting an estimated 1.5 billion people worldwide. It has long been known obesity is associated with poor iron status. Studies have demonstrated this association in children and adolescents, adult men and women, and postmenopausal women and as an independent factor contributing to iron deficiency. A significant proportion of the world's population is iron deficient, obese or both so it is critical to understand the mechanisms underlying obesity induced iron deficiency. One UAES researcher has completed several

cellular iron metabolism studies. The overall conclusion of these studies is obesity increases chronic inflammation through adipocyte hypoxia. Inflammation in turn increases hepcidin production and decreases iron absorption and iron levels in the liver. These studies suggest obese compared to lean people may be at greater risk for iron deficiency anemia.

Youth and Families with Promise

Juvenile criminal activity continues to be a problem in Utah. Utah's Youth and Families with Promise (YFP) program focuses on this issue through multiple interventions target at-risk youth and their families. This program started with 14 youth and 20 mentors. It has grown into a national program positively impacting over 3000 youth and their families each year.

FOOD SAFETY

Food Safety Manager Certification Program

Many rural and Utah food managers do not have ready access to training and certification for managers of retail and food service operations. Manager Certification is mandatory in Utah. USU provides online, DVD, and textbook learning together with online testing for food safety managers in all counties. This Food Safety Manager training provides the core food safety information used to help retail and foodservice venues produce safe foods for their consumers. Seven hundred and three people registered for the FSMC class/exam in 2012. Five hundred and eighty-five people passed the exam. The remaining people (118) registered for the class have not taken the exam and are expected to soon.

Total Actual Amount of professional FTEs/SYs for this State

Year: 2012	Extension		Research	
	1862	1890	1862	1890
Plan	110.0	0.0	60.5	0.0
Actual	101.6	0.0	77.0	0.0

II. Merit Review Process

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

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

2. Brief Explanation

Agricultural Experiment Station: The scientific peer-review processwithin the agricultural experiment station involves two steps. Prior to submission to the experiment station, the PI's department head reviews and signs off on the proposal. Once the proposal reaches the station, two scientific peer reviews are 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). (If there is a conflict between these two reviews, an additional peer review is sought.) These anonymous external reviews are returned to the experiment station and the PI's are asked to respond to issues raised by these reviewers. The PI then modifies 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 offcampus to qualified subject matter

experts has been used approximately 10% of the time.

III. Stakeholder Input

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

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

Brief explanation.

The media sources are frequently used by Utah counties to encourage county residents to participate in public meetings and listening sessions. Use of the local newspaper and radio through public service announcements and paid advertisements are the two primary techniques applied in media use. Counties targeted traditional stakeholders through letter/poster invitations to participate in public meetings and listening sessions. Such announcements are often placed in public places, on bulletin boards, and other locales frequented by non-traditional audiences. Non-traditional stakeholder groups were also invited to participate in public meetings and listening sessions. 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. Surveys serve as another means for contacting stakeholders. For the experiment station, research scientists, often with an extension appointment, work with extension leaders to ensure that ample stakeholder participation is achieved. Even faculty with primary research appointments and strong industry affiliations often provide a unique perspective about different audiences that should be cultivated or developed.

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

1. Method to identify individuals and groups

- Use Advisory Committees
- Use Internal Focus Groups
- Open Listening Sessions
- Use Surveys

Brief explanation.

The Utah Agricultural Experiment Station uses many of the same advisory groups used by Extension that meet as needed to provide critical input from the public and private sectors. Listening groups with key and inclusive constituents are also utilized. Utah Extension utilizes advisory committees as the primary means of identifying stakeholder individuals and groups to collect program input. Principle council and advisory groups utilized included such groups as teen councils, horse and livestock councils, Workforce Services, Interagency Coalitions, community religious leaders, United Way, Utah Saves Advisory Boards, Utah Fair Boards, Utah Farm Bureau and Farmers Union, afterschool coalitions and previous recipients of Extension programs have been utilized. Counties used focus groups and open listening sessions as means to identify groups and

individual stakeholders. Needs assessments and surveys provided another primary means of identifying individuals and groups though who input was collected.

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

1. Methods for collecting Stakeholder Input

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

Brief explanation.

The input received from stakeholders was utilized most to redirect Experiment Station and Extension programs, to gather information on emerging issues, and to set priorities as a unified Extension and Experiment Station organization. With an ever growing metro population along the Wasatch Front in Utah this input has been valuable in redirecting Extension and Experiment Station program emphasis areas to reflect the needs of metropolitan populations. To a lesser extent, input was applied to Extension programs in redirecting applied research programs, in the hiring of staff and in the action plans of the county. These inputs frequently inform Extension through influencing recruitment and hiring practices and inform Extension on the types of research that stakeholders perceive as critical to their need. The Experiment station uses stakeholder input provided by Extension and advisory groups' input to make changes in its research programs. As evidenced by existing and past hiring patterns, the Experiment Station has been changing program emphasis as open positions allow and/or through newly funded positions. With those funded positions go operating and graduate student funds.

3. A statement of how the input will be considered

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

Brief explanation.

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along the Wasatch Front in Utah this input has been valuable in redirecting Extension and Experiment Station program emphasis areas to reflect the needs of metropolitan populations. To a lesser extent input was applied to Extension programs in redirecting research programs, in the hiring of staff and in the action plans of the county. These inputs frequently inform Extension through influencing recruitment and hiring practices and inform Extension on the types of research that stakeholders perceive as critical to their need. The Experiment station uses stakeholder input provided by Extension and advisory groups' input to make changes in the research program. As evidenced by existing and past hiring patterns, the Experiment Station has been changing program emphasis as open positions allow and/or through newly funded positions. With those funded positions go operating and graduate student funds.

Brief Explanation of what you learned from your Stakeholders

Most stakeholders are tied to specific program areas although they are interested in all programs offered through USU Extension and the Experiment Station. Areas dealing with home horticulture and organic gardening for food production are important to the general public. Agricultural sustainability including marketing, weed control, crop management and animal health issues are important to agricultural producers and these areas are supported by both the Experiment Station and Extension. Economics of various new technologies or production techniques are important research toipics for the Experiment Station. Basic home making skills including food preservation/preparation, food safety, nutrition and sewing are important to home makers and are supported extensively by Extension and the Experiment Station. Families and individuals also want food and finance programs, which require both Extension and Exeriment Station input. Youth leadership development and continuation of traditional 4-H programs such as livestock, horse, sewing, cooking, and others are important and stakeholders want to make sure these programs stay alive and viable and are supported primarily through Extension. Most users of USU soil testing service value the service and want it to continue. The Experiment Station is involved in a host of research issues relating to natural resources and the environment including climate change, public lands, water resources, urbanization of productive farmland, etc. The public makes little, if any, distinction between Extension and the Experiment Station and likes USU to be available to help with a wide range of issues.

IV. Expenditure Summary

1. Total Actual Formula dollars Allocated (prepopulated from C-REEMS)			
Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
1672528	0	2280159	0

2. Totaled Actual dollars from Planned Programs Inputs				
	Extension		Research	
	Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
Actual Formula	1672528	0	2280632	0
Actual Matching	1672528	0	2285143	0
Actual All Other	0	0	14447965	0
Total Actual Expended	3345056	0	19013740	0

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

V. Planned Program Table of Content

V(A). Planned Program (Summary)

Program # 1

1. Name of the Planned Program

Global Food Security and Hunger

☑ Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
123	Management and Sustainability of Forest Resources	4%		5%	
201	Plant Genome, Genetics, and Genetic Mechanisms	0%		15%	
202	Plant Genetic Resources	0%		10%	
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants	0%		5%	
205	Plant Management Systems	47%		5%	
211	Insects, Mites, and Other Arthropods Affecting Plants	5%		2%	
213	Weeds Affecting Plants	0%		5%	
215	Biological Control of Pests Affecting Plants	0%		8%	
216	Integrated Pest Management Systems	10%		2%	
301	Reproductive Performance of Animals	0%		10%	
302	Nutrient Utilization in Animals	0%		5%	
304	Animal Genome	0%		20%	
307	Animal Management Systems	32%		5%	
603	Market Economics	2%		3%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2012	Extension		Research	
	1862	1890	1862	1890
Plan	27.0	0.0	23.4	0.0
Actual Paid Professional	27.4	0.0	26.2	0.0
Actual Volunteer	0.0	0.0	0.0	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	**1890 Extension**	**Hatch**	**Evans-Allen**
450606	0	1288837	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
450606	0	1292125	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
0	0	5788377	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

1. Conduct research experiments with livestock and plants and plant material.
2. Publish studies and make presentations related to plant propagation and livestock reproduction and actual plant and livestock production.
3. Conduct workshops and meetings to educate local, state, and regional stakeholders concerning progress in producing livestock and plants that are economically viable and environmentally friendly.
4. Provide new methods of livestock pest control and disease prevention.
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 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.
8. Coordinate efforts with other states and the Western Region Pest Management Center (WRPMC).
9. Enhance the USU Master and 4-H Junior Master Gardener Programs.
10. Utilize multiple demonstrations/applied research plots to manage weeds in agronomic crops with results reported at field days, workshops, or annual meetings.
11. Conduct research experiments and develop theories that can be used to enhance plant and animal productive efficiencies through the use of genomics.
12. Publish studies related to these areas of concern.
13. Conduct workshops and meetings for other scientists involved in this area of research.
14. Develop applications for the research on plant and animal genomics to directly benefit producers, youths, and other scientists.
15. Conduct market tests to determine the price premium associated with alternative production and marketing programs.
16. Build models to quantify the impacts associated with international trade.
17. Develop risk reduction models for agricultural producers.
18. Analyze firm-level decisions to identify specific changes that might be made on individual farms and ranches that would enhance net returns.
19. Provide 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, 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, identification of business

opportunities, and youth entrepreneurship programs.

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, local and regional livestock (primarily beef, dairy and equine) producers, small acreage owners, veterinarians, USDA, other private businesses, and government entities that conduct work in this area.

3. How was eXtension used?

In 2012, Ronda Miller continued as the leader for the Environmental Planning section of the Animal Manure Management Community on eXtension and coordinated a "Nitrates in Groundwater" webcast.

USU is part of the national, world-wide impact eXtension Community of Practice (COP). The MapASyst Community of Practice (CoP) consists of geospatial extension programs from 15 states collaborating as the National Geospatial Technology Extension Network (NGTEN) (http://www.geospatialextension.org). These states include Ohio, North Dakota, Rhode Island, New Hampshire, Texas, Alabama, Missouri, Virginia, Louisiana, Arizona, Connecticut, Utah, Mississippi, Nebraska, and Oklahoma. The mission of NGTEN is to provide education and decision support on the practical use of earth systems science and technology to users and communities for solving problems and help meet the growing demands for a spatially literate workforce. This network facilitates geospatial technology and educational expertise among the CoP involving applications of geographic information systems (GIS), global positioning systems (GPS), satellite and aerial imagery and localized geographic information data and resources. NGTEN is an effort to foster communication, collaboration, and resource sharing among participating states and to encourage ties to research and development efforts in academia, industry, and federal agencies. NGTEN is essentially what eXtension calls a CoP- an informal network that helps share ideas, leverage successful educational programs and geospatial applications, and ultimately identify the 'best of the best' for implementation locally. The 15 Geospatial Extension Specialists (GES) will provide the initial leadership and management, and content expertise to Map@Syst.

The NGTEN members provide content expertise over 20 areas of interest. A few of these interest areas include community development, public health, precision agriculture, range management, coastal management, homeland security, disaster management, disease management, wildlife, natural resources, 4-H and youth development, and land use. The CoP boasts a comprehensive collaboration of people to draw from for content development. Some of these include universities (ie, researchers, Extension educators, instructors), community colleges, K-12, Sea Grant, Space Grant, non-profits, industry, and other local, state and federal government agencies.

There is alink to eXtension's "Ask an Expert" feature from the USU Extension webpage.

V(E). Planned Program (Outputs)

1. Standard output measures

2012	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	64843	587727	21904	198534

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

Patent Applications Submitted

Year: 2012

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2012	Extension	Research	Total
Actual	0	138	138

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Contract/Grant Funds Generated

Year	Actual
2012	5778058

Output #2

Output Measure

- Number of Graduate Students/Post Docs Trained

Year	Actual
2012	51

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number of clientele who gain knowledge about improved human, plant, and animal management systems.
2	Number of clientele who implement improved human, plant, and animal management systems.

Outcome #1

1. Outcome Measures

Number of clientele who gain knowledge about improved human, plant, and animal management systems.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	21591

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Noxious weeds pose a great threat to agriculture, wildlife, bio-diversity, and other natural resources in Juab County. Considerable work needs to be done to control weeds such as Squarrose Knapweed, Russian Knapweed, Field Bindweed, Hoary Cress and Salt Cedar. In addition to chemical methods other control methods such as grazing systems, biological control, and competitive plants need to be evaluated. Identifying new and invading weed species will be a top priority. Other priorities include public education and coordination of weed control efforts on private and public lands.

What has been done
As a member of the Squarrose Knapweed and Sanpitch CWMA's and the Juab County Weed Program, USU Extension received five weed control grants totaling $215,200. During eight work days, 1,500 acres were treated with herbicide covering 6,500 acres.

Results
As a result of the weed control grants, work days and cooperation of the CWMA's, 400 acres were identified, treated, and reseeded resulting in an $80,000.00 savings to the producers.

4. Associated Knowledge Areas

KA Code	Knowledge Area
123	Management and Sustainability of Forest Resources
202	Plant Genetic Resources
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
205	Plant Management Systems

211	Insects, Mites, and Other Arthropods Affecting Plants
213	Weeds Affecting Plants
215	Biological Control of Pests Affecting Plants
216	Integrated Pest Management Systems
301	Reproductive Performance of Animals
302	Nutrient Utilization in Animals
307	Animal Management Systems
603	Market Economics

Outcome #2

1. Outcome Measures

Number of clientele who implement improved human, plant, and animal management systems.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	8370

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Efficient production of field crops and forages is essential to maintaining the economic viability of Utah?s agricultural operations. Each year, Utah farmers and ranchers produce commodities that generate nearly $1.5 billion in income, with crop sales accounting for approximately 26% of this value(NASS 2010). Advances in science and technology have enabled growers to increase the productivity and/or efficiency of their farming operations.

What has been done
The Utah Hay and Forage Symposium is sponsored by USU Extension and Utah Farm Bureau Federation. Twenty one speakers from a broad range of organizations across several states was designed to address critical issues facing Utah hay growers. A USU crops specialist gave a presentation on weed competition and herbicide application timing.

Results
As a result of information provided a central Utah grower with approximately 4,000 acres of corn reported that altering his herbicide program in 2011 improved his corn silage yield by nearly 5

tons per acre, an increase in crop value of approximately $0.9 million in that year alone.

4. Associated Knowledge Areas

KA Code	Knowledge Area
123	Management and Sustainability of Forest Resources
201	Plant Genome, Genetics, and Genetic Mechanisms
202	Plant Genetic Resources
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants
213	Weeds Affecting Plants
215	Biological Control of Pests Affecting Plants
216	Integrated Pest Management Systems
301	Reproductive Performance of Animals
302	Nutrient Utilization in Animals
304	Animal Genome
307	Animal Management Systems
603	Market Economics

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

Everyone of the above checked factors have had a negative impact on this program area!

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Many of the programs offered through Extension have participant selg evaluations where results are used to document impacts. Evaluations in 2011 of some extension programs falling under the Global Food Security and Hunger included the USU Risk

Management Education for Agriculture program, workshops on assessing use of alternative low-water crops, the Western Sustainable Agriculture Research and Education (SARE) program, Master Gardener courses, Utah Beef Field Day, Arizona Strip Range Workshop and Tour, and USU Food and Agricultural Marketing program. These are self administered questionnaires given at the time of the program. In some evaluations there are also six month follow-up questionnaires.

Key Items of Evaluation

Farmers participating in the USU Risk Management Education for Agriculture program applied what they learned to their farming operations. Results from an evaluation sent out six months after the program showed 30% had applied for a USDA (FSA, NRCS, etc.) loan and/or grant program, 32% said their farming operation is now more economically viable and 41% felt the quality of life on their farm improved. In addition the self assessment evaluation showed that a majority of respondents felt they understood developing business/marketing plans, maintaining financial records and budgeting, using cost-effective production strategies, using cost effective promotional techniques, pricing products and implementing pricing strategies, food safety management, assessing operation specific/applicable taxes, and accessing local resources/technical support .

Participants in the Agriculture Research and Education (SARE) program were positive on many best practices taught in the program. Participants committed to creating a plan to introduce seminar curriculum and other SARE resources into producer programming and working one-on-one with producers to evaluate the economic feasibility of alternative low water use crops on their farm ranch and assisting them to introduce low water use crops. They were also positive about providing an overview of the benefits of utilizing the WATER-ACIS spreadsheet tool and demonstrate its use to producers and in assisting producers with the measurement of changes in profitability and economic sustainability of alternative crop use.

Utah Beef Cattle Field Day was held in February with 185 participants with various production-related speakers. All of those attending said they would benefit from attending the field day. Producers come from all of Utah and a few from neighboring states to be updated on topics ranging from economics and production to marketing and consumer demand.

An evaluation of the USU Food and Agricultural Marketing program showed that approximately 50% of participants created a formal business and marketing plan in the course. Comparison of pre and post course assessments showed participant increases in following production, financial, and marketing plans for their operation. They also had increased understanding on pricing products and implementing pricing strategies, using effective merchandising at direct markets, showcasing product variety and abundance at direct markets, and assessing operation specific/applicable taxes. There was also increased knowledge of where/how to obtain marketing strategy advice and business management support.

V(A). Planned Program (Summary)

Program # 2

1. Name of the Planned Program

Climate Change and Natural Resource Use

☑ Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
102	Soil, Plant, Water, Nutrient Relationships	6%		10%	
112	Watershed Protection and Management	8%		10%	
121	Management of Range Resources	9%		5%	
123	Management and Sustainability of Forest Resources	4%		3%	
132	Weather and Climate	0%		20%	
201	Plant Genome, Genetics, and Genetic Mechanisms	0%		15%	
205	Plant Management Systems	42%		15%	
213	Weeds Affecting Plants	1%		5%	
307	Animal Management Systems	29%		10%	
605	Natural Resource and Environmental Economics	1%		7%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2012	Extension		Research	
	1862	1890	1862	1890
Plan	13.0	0.0	23.7	0.0
Actual Paid Professional	10.4	0.0	25.1	0.0
Actual Volunteer	0.0	0.0	0.0	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	**1890 Extension**	**Hatch**	**Evans-Allen**
171221	0	459336	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
171221	0	459336	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
0	0	6017906	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

1. 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.
2. Educate the public with respect to the principle causes of air pollution and their role in prevention.
3. Partner with others to enable agriculture producers to meet EPA requirements.
4. Establish herbicide demonstration/research plots to evaluate the efficacy of these products under local conditions.
5. Conduct projects consultations, and workshops focusing on the role of outdoor recreation and natural resource-based tourism in relation to community development.
6. Partner with others in education and use of resources to rehabilitate the sagebrush steppe environment.
7. Educate and partner to enable the recovery of the sage grouse, pygmy rabbit and others to avoid listing as endangered species.
8. Determine management options that slow or stop the cycle of cheatgrass and fire on previously burned areas through range rehabilitation, seeding programs and nontraditional approaches to grazing management.
9. 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.
10. Educate the public on responsible use and the value of multiple uses on rangelands.
11. Illustrate the need for management and control of pinion-juniper forests to restore watershed, wildlife habitat and forage values on rangelands.
12. Educate the public regarding various options with respect to adapting to global climate change
13. Provide information to landowners and users on grazing management of grazeable lands.
14. Partner with and educate the general public, livestock producers and agency personnel on the identification and methods of control of the specific noxious and invasive species.
15. Conduct experiments and develop theories that can be used to enhance water, soil, wildlife, and for various agronomic and urban areas.
16. Publish studies relating to this program area.
17. Provide educational training, problem solving, and in-depth applied information to: facilitate rehabilitation of degraded watersheds, protect and manage watersheds, conserving, managing and enhancing efficient water use, derive efficient irrigation strategies and technologies, implement water-wise landscaping practices, evaluate and promote plants that require less water and are drought tolerant, preserve and enhance water quality, enhance quality, capture, and use of storm-water and gray-water, identify areas of current or potential soil loss or reduced soil fertility and partner with other agencies to reduce and control these problems, educate producers on the important interactions of soil and irrigation,

provide information on soil nutrient deficiencies and cost effective soil quality and fertility improvements, continue demonstration projects - salinity, soil types, non-traditional soil fertility amendments, fertilizer formulation efficacy, organic matter use and management.

2. Brief description of the target audience

The target audience includes the general public, users of various environments (agricultural producers, extractive industry representatives, environmentalists, green industry professionals, etc.), small acreage owners, private forest owners, extension agriculture and horticulture agents, federal and state water and soil management agencies, and other academics and resource managers.

3. How was eXtension used?

There is a link to eXtension's "Ask an Expert" feature from the USU Extension webpage .

V(E). Planned Program (Outputs)

1. Standard output measures

2012	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	8789	495285	7351	414249

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

Patent Applications Submitted

Year:	2012
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2012	Extension	Research	Total
Actual	0	81	81

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of Graduate Students/Post Docs Trained

Year	Actual
2012	51

Output #2

Output Measure

- Contract/Grant Dollars Generated

Year	Actual
2012	5789981

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number of clientele who gain knowledge about improved human, plant, and animal management systems that relate to climate change and/or natural resource use.
2	Number of clientele who implement improved human, plant, and animal management systems as related to climate change and/or natural resource use.

Outcome #1

1. Outcome Measures

Number of clientele who gain knowledge about improved human, plant, and animal management systems that relate to climate change and/or natural resource use.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	22918

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
112	Watershed Protection and Management
121	Management of Range Resources
123	Management and Sustainability of Forest Resources
132	Weather and Climate
201	Plant Genome, Genetics, and Genetic Mechanisms
205	Plant Management Systems
213	Weeds Affecting Plants
307	Animal Management Systems
605	Natural Resource and Environmental Economics

Outcome #2

1. Outcome Measures

Number of clientele who implement improved human, plant, and animal management systems as related to climate change and/or natural resource use.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	14368

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
According to the U.S. Environmental Protection Agency, 30-60% of urban fresh water is used in the landscape. Fifty percent of applied water is lost due to run off and evaporation associated with inefficient irrigation systems. The Water Conservation District and the USEC assists Utah residents through the education of water conservation principles in the landscape.

What has been done
Utah Agricultural Experiment Station research in urban water consumption by landscapes has resulted in a method that allows the identification of high-end users, allowing municipalities to target these users for leaks and/or sprinkler checks and education, improving the overall efficiency of water use and delaying or avoiding the need for large new investments in water transmission structures.

Results
Evaluations concerning 60% of the water that Salt Lake City Corporation (SLCC), delivers to 400,000 daytime users, indicates that it is of legally adequate quality, and that SLCC does not need to change management. For Cache Valley?s 198,000 residents, improved groundwater management strategies will result from this project next year. Peruvian national planners for the 9 million residents of the Lima-Callao metropolitan area better understand data needs for accurately predicting contamination threats to water supply. The US State Department and national planners for Jordan?s 6,000,000 residents have accepted projections concerning when and where it will be too expensive to irrigate with groundwater.

4. Associated Knowledge Areas

KA Code	Knowledge Area

102	Soil, Plant, Water, Nutrient Relationships
112	Watershed Protection and Management
121	Management of Range Resources
123	Management and Sustainability of Forest Resources
132	Weather and Climate
201	Plant Genome, Genetics, and Genetic Mechanisms
205	Plant Management Systems
213	Weeds Affecting Plants
307	Animal Management Systems
605	Natural Resource and Environmental Economics

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

Everyone of the above checked factors have had a negative impact on this program area!

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Many of the programs offered through Extension have participant self evaluations where results are used to document impacts. Evaluations of some extension programs falling under the Climate Change and Natural Resource Use include workshops on assessing use of alternative low-water crops, the Western Sustainable Agriculture Research and Education (SARE) program, and Master Gardener courses. These are self administered questionnaires given at the time of the program. In some evaluations there are also six month follow-up questionnaires.

Key Items of Evaluation

V(A). Planned Program (Summary)

Program # 3

1. Name of the Planned Program

Sustainable Energy

☑ Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
206	Basic Plant Biology	0%		25%	
402	Engineering Systems and Equipment	55%		35%	
403	Waste Disposal, Recycling, and Reuse	45%		40%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2012	Extension		Research	
	1862	1890	1862	1890
Plan	1.0	0.0	0.7	0.0
Actual Paid Professional	0.2	0.0	1.8	0.0
Actual Volunteer	0.0	0.0	0.0	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	**1890 Extension**	**Hatch**	**Evans-Allen**
3293	0	157416	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
3293	0	157948	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
0	0	206747	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

1. Conduct research into alternative biofuels and methods of production that are well-suited for the Intermountain West.
2. Publish in peer-reviewed journals and other professional outlets.
3. Take the research that is done and adapt that research so useful practical strategies might be followed in producer biofuels to the extent that it can be shown to be beneficial in terms of benefits and costs.

2. Brief description of the target audience

For experiment station faculty their target audiences are geared primarily towards extension specialists, county agents, and other scientists; the specialists' audiences include peers, county agents, federal and state organizations, producer groups, state and local government, and the general public. County agents work cooperatively with federal, state, and local governments, citizen groups, and the public to address sustainable energy issues in their areas.

3. How was eXtension used?

There is a link to eXtension's "Ask an Expert" feature from the USU Extension webpage

V(E). Planned Program (Outputs)

1. Standard output measures

2012	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	144	494	14	48

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

Patent Applications Submitted

Year:	2012
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2012	Extension	Research	Total
Actual	0	6	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of Graduate Students/Post Docs Trained

Year	Actual
2012	5

Output #2

Output Measure

- Contract/Grant Dollars Generated

Year	Actual
2012	191054

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number of clientele gaining sustainable energy knowledge
2	Number of clientele who implement sustainable energy practices

Outcome #1

1. Outcome Measures

Number of clientele gaining sustainable energy knowledge

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	220

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
206	Basic Plant Biology
402	Engineering Systems and Equipment
403	Waste Disposal, Recycling, and Reuse

Outcome #2

1. Outcome Measures

Number of clientele who implement sustainable energy practices

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	130

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
206	Basic Plant Biology
402	Engineering Systems and Equipment
403	Waste Disposal, Recycling, and Reuse

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

Everyone of the above checked factors have had a negative impact on this program area!

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Many of the programs offered through Extension have participant self evaluations where results are used to document impacts. Evaluations of some extension programs falling under Sustainable Energy include the Induced Bed Reactor and alternative crop production.

Key Items of Evaluation

V(A). Planned Program (Summary)

Program # 4

1. Name of the Planned Program

Childhood Obesity, Nutrition and Community

☑ Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
608	Community Resource Planning and Development	9%		10%	
702	Requirements and Function of Nutrients and Other Food Components	0%		35%	
703	Nutrition Education and Behavior	11%		5%	
724	Healthy Lifestyle	2%		5%	
801	Individual and Family Resource Management	13%		10%	
802	Human Development and Family Well-Being	6%		5%	
803	Sociological and Technological Change Affecting Individuals, Families, and Communities	0%		25%	
806	Youth Development	59%		5%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2012	Extension		Research	
	1862	1890	1862	1890
Plan	67.0	0.0	4.5	0.0
Actual Paid Professional	61.0	0.0	16.2	0.0
Actual Volunteer	0.0	0.0	0.0	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	**1890 Extension**	**Hatch**	**Evans-Allen**
1004768	0	121830	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
1004768	0	122004	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
0	0	1441119	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

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.

3. Conduct workshops and meetings, deliver activities, develop new curricula, write newsletters and news releases and post Internet fact sheets.

4. 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.

5. Include the following materials or media sources in training sessions: 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.

6. Utilize different teaching methods of The Utah Food Stamp Nutrition Education including individual, group classes, DVD video series, and an on-line course. FSNE Nutrition Education Assistants will provide other nutrition education opportunities to FSNE participants

7. Use the "Give Your Body the Best" curriculum developed in 2005 by USU to teach individuals or groups of low income persons regarding chronic diseases; on food allergies, intolerance, and poisoning; and lessons on getting to know foods and enjoy them.

8. Increase the capacity among other extension personnel to participate in or lead community self-assessments (SWOT analyses, asset mapping, search conferencing, surveys, etc.) that lay the groundwork for subsequent project activities.

9. 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.

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

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

12. Deliver educational and informational services through various media.

13. Develop educational resources related to rural economic viability for community leaders and other stakeholders

14. Provide for local training in principles developed that are related to this area of study.

15. 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).

16. Provide consultations regarding land use planning policies and their implications on growth.

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.

3. How was eXtension used?

Regional and National Extension Initiatives including Western Rural Development Center Small Business Management Resources; eXtension Entrepreneurs and their Communities providing on-line business assistance to entrepreneurs and communities throughout the country; and USDA Rural Development sponsored national initiative "Stronger Economies Together" now including 36 participating states.

There is a link to eXtension's "Ask an Expert" feature from the USU Extension webpage

V(E). Planned Program (Outputs)

1. Standard output measures

2012	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	189364	759693	397672	1595385

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

Patent Applications Submitted

Year:	2012
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2012	Extension	Research	Total
Actual	0	40	40

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of Graduate Students/Post Docs Trained

Year	Actual
2012	43

Output #2

Output Measure

- Contract/Grant Dollars Generated

Year	Actual
2012	1430801

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number of clientele who gain knowledge about nutrition education and behavior.
2	Number of clientele who implement practices of nutrition education and behavior.
3	Number of clientele who gain knowledge about individual and family resource management.
4	Number of clientele who implement individual and family resource management.

Outcome #1

1. Outcome Measures

Number of clientele who gain knowledge about nutrition education and behavior.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	78433

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
702	Requirements and Function of Nutrients and Other Food Components
703	Nutrition Education and Behavior
724	Healthy Lifestyle
801	Individual and Family Resource Management
802	Human Development and Family Well-Being
803	Sociological and Technological Change Affecting Individuals, Families, and Communities
806	Youth Development

Outcome #2

1. Outcome Measures

Number of clientele who implement practices of nutrition education and behavior.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	15919

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The benefits of fruit and vegetable consumption are documented extensively, yet more than 75 percent of Americans do not eat the recommended servings advised by the current Dietary Guidelines for Americans and MyPlate.

What has been done
The Utah State University Supplemental Nutrition Assistance Program -Education (SNAP-ed) teaches low-income audiences, specifically targeting those on the Supplemental Nutrition Assistance Program (SNAP). Lessons focused on the current dietary guidelines and experiential learning activities reinforced nutrition concepts and taught needed skills to eat healthy on a limited budget.

Results
Participants in the Utah SNAP-Ed program increased their daily vegetable and fruit intake following at least four curricula in the SNAP-Ed program. This increase in intake was significant across all five years (2007-2011) of behavioral data.

4. Associated Knowledge Areas

KA Code	Knowledge Area
608	Community Resource Planning and Development
702	Requirements and Function of Nutrients and Other Food Components
703	Nutrition Education and Behavior
724	Healthy Lifestyle

801	Individual and Family Resource Management
802	Human Development and Family Well-Being
803	Sociological and Technological Change Affecting Individuals, Families, and Communities
806	Youth Development

Outcome #3

1. Outcome Measures

Number of clientele who gain knowledge about individual and family resource management.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	55317

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
702	Requirements and Function of Nutrients and Other Food Components
703	Nutrition Education and Behavior
724	Healthy Lifestyle
801	Individual and Family Resource Management
802	Human Development and Family Well-Being
803	Sociological and Technological Change Affecting Individuals, Families, and Communities
806	Youth Development

Outcome #4

1. Outcome Measures

Number of clientele who implement individual and family resource management.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	19255

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Many entrepreneurs and new business owners lack the knowledge, experience and technical management skills to survive the difficult and competitive process of starting and maintaining a new business venture. This is especially true of rural businesses and entrepreneurs where the decline in traditional agriculture and natural resource based income has led to increased rates of poverty and fewer oppoortunities for non-farm jobs in rural areas.

What has been done
A regional county based Business Outreach Support Services (BOSS) team was created and supported by a coalition fo Extension specialists with assignment in entrepreneurship and business development. Extension Small Business Development Centers provide small business management training and one-on-one counseling to local entrepreneurs and small business owners. Business Resource Centers (BRC) providing one-stop business services have been developed with RCDE to help leverage entrepreneurial and economic development opportunities in rural Utah.
Regional and National Extension Initiatives including Western Rural Development Center Small Business Management Resources; eXtension Entrepreneurs and their Communities providing on-line business assistance to entrepreneurs and communities throughout the country; and USDA Rural Development sponsored national initiative "Stronger Economies Together".

Results
These activities resulted in 234 jobs created,115 existing jobs were retained and 96 new business start-ups;$2.9 million in increased sales and $4.6 million in total capital formation reported. Overall, 3661 Utah residents received training, counseling or other services as a result of Extension Business, Entrepreneurship and Rural Development activities statewide.

4. Associated Knowledge Areas

KA Code	Knowledge Area
608	Community Resource Planning and Development
702	Requirements and Function of Nutrients and Other Food Components
703	Nutrition Education and Behavior
724	Healthy Lifestyle
801	Individual and Family Resource Management
802	Human Development and Family Well-Being
803	Sociological and Technological Change Affecting Individuals, Families, and Communities
806	Youth Development

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

Everyone of the above checked factors have had a negative impact on this program area!

V(I). Planned Program (Evaluation Studies)

Evaluation Results

In the Food Sense program, evaluations showed that participants increased the number of times they have enough food to last through the end of the month; plan meals and make a grocery list before shopping; refrigerate meat, dairy, and other perishables within two hours of shopping; prepare raw meats, poultry, and eggs separately from other foods; wash hands and surfaces before and after preparing food; use a thermometer when cooking; and cook foods throughly using USDA time/temperature recommendations.

As a result of participating in the SNAP-Ed program participants increased the number of times they were physically active for at least 30 minutes, 5 days a week; made food choices based on healthy choices and by using the nutrition facts label; children and adults in household ate something within two hours of waking; ate meals together as a family at least three times a week; prepared meals at home at least three times per week; ate at least 2 1/2 cups of vegetables, 2 cups of fruit, 3 cups or equivelant of dairy, and two servings of lean protein a day. The number of times participants choose low fat

foods and replaced saturated and trans fats with heart healthy fats, and prepared foods without adding salt also increased.

Key Items of Evaluation

V(A). Planned Program (Summary)

Program # 5

1. Name of the Planned Program

Food Safety

☑ Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
303	Genetic Improvement of Animals	2%		0%	
311	Animal Diseases	0%		10%	
501	New and Improved Food Processing Technologies	0%		10%	
502	New and Improved Food Products	0%		10%	
504	Home and Commercial Food Service	43%		0%	
701	Nutrient Composition of Food	0%		10%	
702	Requirements and Function of Nutrients and Other Food Components	0%		10%	
704	Nutrition and Hunger in the Population	0%		40%	
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources	0%		10%	
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins	55%		0%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2012	Extension		Research	
	1862	1890	1862	1890
Plan	2.0	0.0	5.1	0.0
Actual Paid Professional	2.6	0.0	8.2	0.0
Actual Volunteer	0.0	0.0	0.0	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	**1890 Extension**	**Hatch**	**Evans-Allen**
42640	0	253213	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
42640	0	253730	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
0	0	993816	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

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.
4. Extend research 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: safe food handling practices, safe food preservation and storage practices, certification to food safety managers, safe food handling practices for processors, and 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, and other scientists.

3. How was eXtension used?

There is a link to eXtension's "Ask an Expert" feature from the USU Extension webpage .

V(E). Planned Program (Outputs)

1. Standard output measures

2012	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	7936	345362	1489	64799

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

Patent Applications Submitted

Year:	2012
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2012	Extension	Research	Total
Actual	0	40	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of Graduate Students/Post Docs Trained

Year	Actual
2012	9

Output #2

Output Measure

- Contract/Grant Dollars Generated

Year	Actual
2012	993816

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number of clientele who gain knowledge about home and commercial food service.
2	Number of clientele who implement home and commercial food service practices.

Outcome #1

1. Outcome Measures

Number of clientele who gain knowledge about home and commercial food service.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	893

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
303	Genetic Improvement of Animals
311	Animal Diseases
501	New and Improved Food Processing Technologies
502	New and Improved Food Products
504	Home and Commercial Food Service
701	Nutrient Composition of Food
702	Requirements and Function of Nutrients and Other Food Components
704	Nutrition and Hunger in the Population
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins

Outcome #2

1. Outcome Measures

Number of clientele who implement home and commercial food service practices.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	686

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
303	Genetic Improvement of Animals
311	Animal Diseases
501	New and Improved Food Processing Technologies
502	New and Improved Food Products
504	Home and Commercial Food Service
701	Nutrient Composition of Food
702	Requirements and Function of Nutrients and Other Food Components
704	Nutrition and Hunger in the Population
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

Everyone of the above checked factors have had a negative impact on this program area!

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Evaluations in Food Safety included twenty-two entrepreneurs who attended the first F.O.O.D. Workshop, Farm Products to Food Products. The workshop received an overall rating of 5.7 (7 = very helpful, 1=not helpful), with attendees estimating the value of the workshop to be $500. Several attendees commented on the value and usefulness of the workshop, for example "Good starting point for me. This is very possibly unlimited $$ to me" and "I would love more workshops like this."

Key Items of Evaluation