2014 Utah State University Combined Research and Extension Annual Report of Accomplishments and Results

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I. Report Overview

1. Executive Summary

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 2014 progress report on each is briefly described below. These examples comprise a small fraction of the accomplishments by UCES and UAES.

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 220 agriculturalists and their families remain in agriculture.

Integrated Pest Management

UCES provides outreach education in entomology and integrated pest management (IPM), with research supported by the UAES. The program involves collaborative efforts of entomologists, plant pathologists, weed scientists, and horticulturalists. 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, saving approximately $100/acre in nitrogen costs or about $37,500 per farm and $200 or more/acre savings in insecticide spray costs totaling $7,500 per farm for total savings of $45,000 per farm.

More than 75% of growers know how IYSV is transmitted to onions and 50% can create more sustainable solutions to control the insects. Growers participating in USU sponsored onion research report that 1/3 of their acreage is being grown with consideration of crop rotation, nitrogen status and with better pest management strategies. These growers also report that onions after corn have few thrips to manage.

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. The use of traps resulted 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.

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 fruit and shade trees 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 reduce the number of total applications from three to one or two each year, saving thousands of dollars In the aggregate.

The largest fruit growers in Utah 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). By using the lower cost traditional fertilizers in these aggressive programs, these growers are saving $110 to $240 per acre per year.

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, and tree roots were more abundant in legume alleyways than grass. The straw mulch treatment with grass alleyway used the least water. These strategies will become increasingly critical for fruit growers in drier years. In 2014, yields in some single-leader treatments exceeded 10,000 pounds per acre, based on what was recovered by mechanical harvest, though actual production was likely higher. Work is continuing in this area to determine which of the three tree training systems, four in-row tree spacings, and four rootstocks will yield the highest production.

Crops

Outcomes of the research are primarily cultivars are released and made available to producers. The highest yielding breeding line in 2014 throughout all dryland locations was the line Silver UIUT10210-123 at 34.9 bu/acre. The overall statewide nursery yield of the 36 common entries was 31.6 bu/ac. Bluecreek had the highest nursery yield at 66.5 bu/ac. An additional 4 bu/acre translates into an additional $20 per acre and profit.

For 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. The highest average yielding line in the advanced spring barley yield nurseries was UTSB10901-66 at 139.8 bu/acre. The highest average yield for a released cultivar was 118.3 bu/acre for Millennium, followed by Goldeneye and Statehood hundred at 113.2 and 112.2 bu/acre, respectively. In the winter barley program, the cultivar, Strider, reported the highest average yield at 193.2 bu/acre. The additional yield makes a difference between a profitable and unprofitable harvest.

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.

Utah has a significant segment of its agricultural production in commercial onions. In surveys of field edges of 26 and 31 commercial onion fields from mid-May to early June in each 2013 and 2014, respectively, flixweed had the highest numbers of onion thrips adults and larvae while weeds with modest numbers of onion thrips included common mallow, field bindweed, and shepherd's purse. However, common mallow, flixweed, and field bindweed are perennial weeds, and shepherd's purse is a biennial. These weeds have potential to serve as "green bridge" plants that support thrips and Iris yellow spot virus (IYSV) through the winter to serve as inoculum sources for new onion fields in the spring. It is critical that onion producers control weeds surrounding their onion fields in order to reduce thrip numbers.

Roundup-ready alfalfa hay has been shown to increase yields by 20% and profits by an even larger percentage given the reduction in weed control costs and improved alfalfa quality.

Through the Western IR-4 program, 117 food use pesticide tolerance request from Utah have either been approved or are in various stages of consideration. These requests represent many Utah crops including alfalfa seed, barley, cherries, Kane berries, pears, peaches, milk, and safflower.

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. BQA continues to be one of our major beef themes in the state of Utah. The NCBA beef audits have determined that if beef producers utilized specific management practices as outlined by the BQA program they could capture up to $125 more per animal. This workshop combines the classroom with demonstration and hands-on training.

For six consecutive years USU Extension has hosted a beef cattle reproduction workshop held in Alton, Utah (Kane County). Each year a different reproduction topic is selected. The topic in 2014 was on all aspects of calving and ensuring a live calf. Beef producers from Kane, Garfield, Iron, Piute and Washington Counties in Utah and from Coconino and Mohave Counties in Arizona attended the workshop.

participants own or manage over 7,500 of livestock. Eighty-five percent of the participants rated the overall quality of the workshop as "Excellent or better". Forty-six percent of the participants indicated that they have implemented changes in their herd reproductive management and seen improvements in herd reproduction since attending the workshop.

Approximately every year Extension holds IMB 3910 workshops. Producers are better able to provide a product suited for the wholesale and retail trade after taking this workshop which combines the classroom with demonstration and hands-on training. Beef producers are able to leave having gained a tremendous amount of information that is directly relevant to their farms and ranches. Written evaluations for the course have all been in the outstanding to above average category. There have been approximately 275 participants from Utah, Wyoming, Idaho, Montana, Colorado and Nevada in sixteen workshops. Evaluations indicated that participant understanding in all 15 areas/subjects taught increased significantly from before the workshop to after. Self-assessed understanding in all 15 areas increased significantly ($p<.01$).

A UAES project found that while a foot-and-mouth disease would have a substantial impact on Utah's beef production and sales, traceability systems would reduce the impact of that outbreak. Other studies have confirmed that disease outbreaks among beef cattle, while severe in their economic impact, could be ameliorated by the implementation of traceability systems.

Under one UAES project, linear programming was used to solve for the optimal cow size on each of the following resource base: 0, 90, 180 days. Optimal cow size for the zero and 90 day winter feeding ranches was the 1,400 pound mature cow. However, on the ranch where cows must be fed 180 days, the 1,000 pound cow was the economically optimal cow size. Therefore, the optimal cow size varies with the available resource base.

Based on a 5-year calf price average, the net returns per hectare for a tall fescue-non fertilized pasture were estimate to be -$114.47; for a tall fescue-fertilized pasture were -$101.37; for a tall fescue-alfalfa pasture were +$44.60; and for a tall fescue-birdsfoot trefoil pasture were +$64.45. The pastures with tall fescue and a legume were profitable for 600 pound calves under conditions at the Lewiston Pasture Facility. Still, this does not mean that this would be the most profitable use of land as the net returns per hectare for raising alfalfa would have been considerably higher than that recorded for the tall fescue-legume pastures over the same 5-year interval.

Multiple measures of meat quality and chemical components were determined for multiple beef muscles of cattle finished on grass, grain, and perennial legume diets. Using ANOVA, palatability results indicated that the flavor of feedlot (FL) finished steaks were most liked. However, flavor liking of top choice (TC) retail steaks was similar to ribeye steaks from Birds foot trefoil (BFT) and grass finished (GF) beef, while certified organic grass fed (COGF) retail steaks were lower for flavor liking compared to all beef types, except GF. Liking of tenderness was greatest among BFT, FL and TC steaks. However, TC was similar to GF. Steaks of COGF were rated the lowest in tenderness-liking but were similar to GF. Steaks from FL, BFT and TC were most liked for fattiness. However, COFG and TC were similar with GF steaks which were least liked for fattiness. Liking of juiciness was greatest for BFT and FL steaks. While TC, GF and COGF were lower for juiciness liking. Overall liking and perceived quality was greatest for FL, BFT and TC steaks. However, TC was found to be similar to GF. Meanwhile, GF was similar with the COGF receiving the lowest ranking of overall liking and perceived quality. These results have important implications for the ability of non-feedlot fed beef to compete with feedlot fed beef and it does appear possible for legume-fed beef to satisfactorily compete with top choice retail steaks as far as various palatability tests are concerned.

Results from another UAES project show 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 confirmed mother influences the ability of offspring to self-medicate. This is of relevance for creating innovative management approaches to enhance self-medication in animals.

Continuing research by NIFA and UAES funded scientists at Utah State University have confirmed that (a) developed supplementation strategies which enhanced use of medusahead by sheep and cattle,

(b) assessed fertilization programs that may influence the competitive ability of the plant community infested with medusahead, thus reducing the invasiveness of the weed, and (c) made progress in understanding the human-related issues affecting weed control in the study area. The combination of the lack of perceived need, high cost, aging of the ranching population, and low ranching incomes all suggest that further uptake of these innovations will be limited. However, it is also apparent that if a single or combination of chemical agents were found that could kill medusahead, it is extremely likely it would not remain a significant problem. It is this "silver bullet" that holds the greatest hope for its eventual control.

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 UCES helped organize some of the larger calf pools. Again this year cattlemen were able to market their calves at a higher profit using the San Juan Calf Pool. 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. Through the assistance of the food coalition four producers sold 40 calves this past year to individuals, grocery stores and restaurants in Summit County. The calves are being marketed under the name of "Summit County Beef". The four ranchers involved received an additional $.20/pound live weight compared to selling their calves over the traditional livestock video auction, resulting in $5200.00 additional income.

Sheep

USU Extension is involved with livestock pooling to increase incomes of ranchers in Utah. The Summit County Lamb Pool shipped 1000 lambs. In Uintah County producers received $10,259 for wool would probably have been hauled to the landfill without the wool pool. Additional 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 contribute to the body of knowledge on the relationship between an animal's diet and the subsequent product composition and quality, with an additional positive effect on prices.

UAES researchers learned that 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.

Dairy

A UAES project evaluated potential effects of supplementing virgin coconut oil (VCO), tannin extracts from pine bark (PBTE), and their combination (VCO+PBTE) in a lactation dairy diet. Contrary to our expectation, supplementing VCO did not affect methane production and ammonia-N concentration possibly due to lack of specific fatty acids against methanogens and/or protozoa. Supplementing PBTE decreased ammonia-N concentration without effect on methane production. The limited effects of PBTE only on ammonia-N concentration may have been attributed from a relatively low concentration of condensed tannins in the diet (approximately 2.0% DM). The overall results from this in vitro study indicate that PBTE can be a feed additive in ruminant diets to improve N utilization efficiency.

Nutrition is a major component of managing heifers. A study was conducted to determine growth performance and ruminal fermentation of dairy heifers when fed Teff (Erogrostis tef [Zucc.], Poaceae) hay-based diets. Rations were formulated to similar energy and protein requirements to meet the dietary needs of the heifers and individual intake collected. Intake of DM significantly increased by feeding the teff grass diet to dairy heifers. Feeding the teff grass diet increased body weight gain and ADG. Using a cost for alfalfa of $220/ton; the teff hay ration cost becomes equal to the alfalfa hay ration at a teff cost of $185/ton (less than this would be an advantage for teff). Teff grass can be a viable, lower-cost, palatable alternative to feeding alfalfa in dairy heifer diets.

The environment of dairy calves can have an impact, but is not well characterized over long-periods of time. Body weight, hip height, starter intake and weather data (temperature, wind speed, relative humidity, precipitation and barometric pressure) were collected for 100 dairy calves over a 1-year

period. A regression model was developed including starter intake, milk intake, hip and wither height, calf heath scores, and weather data with weight gain as the dependent variable for each of the 4 seasons of the year. The fall season (September, October, and November) had a negative impact on calf intake and weight gain (averaging 20 pounds (9.1 kilograms) less at two months) than other seasons. Calves raised in the winter months also ate significantly more starter, but had the same weight gain as other seasons. We conclude that environmental stress factors impact animal welfare and animal productivity, which in turn impacts the economics of the dairy operation and should also be used in determining husbandry practices.

The USU Extension Dairy Specialist and his team have done three statewide surveillance projects of bulk tank milk from most dairy farms in Utah, testing for several important diseases (mycoplasma, Johne's disease, and/or BVD.) Follow up and outreach, including visits and farm-specific programs, regarding bulk tank milk statewide surveillance results were done. The prevalence of Utah dairy herds infected with mycoplasma mastitis has been markedly reduced in Utah in association with the ongoing surveillance and follow up projects. Utah has been changed from one of the highest prevalence mycoplasma states in 2007 into one of the lowest states in terms of mycoplasma infection of dairy herds (97% of herds negative) ever reported.

Farmers Markets

Consumers in Utah and Nevada attend farmers markets primarily to purchase fresh produce, followed by social interaction. Purchasing ready-to-eat foods or packaged foods, arts, and crafts were not strong motivators. These consumers tend to be married individuals that higher income levels and those with strong diet/health concerns and supportive of local farming in agricultural open space. Those attending for social interaction were more likely to be unmarried or larger families attending music or other events at the market. Farmers' market shoppers exhibited strong preferences for product quality, freshness, and local origin. While they were willing on average to pay premiums for both certified organic and locally-labeled produce, the premiums for locally-produced products exceeded those organic produce. Surprisingly, this difference became even more pronounced as consumers were given information about organic growing methods. Demand for fresh produce is very inelastic, exhibiting small changes in quantity demanded as a result of price changes.

CLIMATE CHANGE AND NATURAL RESOURCE USE

Water Conservation

UAES 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. The recent drought had a major impact on increasing rancher indebtedness in Utah. This, in turn, has spurred more interest in drought preparedness in general.

Total annual economic value of maintaining current nutrient load in waters throughout the state of Utah are estimated to be between $3.13 and $13.61 per household for those households who engage in water-based recreation, and between $2.19 and $7.05 per household for those who do not recreate on Utah waters. For water quality improvements, "user" households were willing to pay between $8.11 and $31.97 per household annually, whereas non-user households were not willing to pay any more than they would to maintain current water quality.

Rangeland

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, UCES agents, specialists and UAES researchers are providing specific information and assistance with issues related to rangeland resources, including management, capabilities, values and uses.

UAES research discovered that high concentrations of AC (1 kg m-2) were required to increase

germination of desirable vs. undesirable species in plots. Three years after our large-scale applications, 1 kg m-2 AC applications increased the ratio of desirable/undesirable species cover by 28% and decreased undesirable species cover by 25%. Lower concentrations of AC were not found to be effective. Together, results suggest that activated carbon (AC) needs to be at high concentrations (1 kg m-2) to increase native species growth and reduce undesirable species. In addition, AC effects can take years to have a measurable effect, and will not be measurable when there is little to no native plant establishment.

Under UAES-sponsored research, a new salinity tolerance screening technique and apparatus for greenhouse use was developed. The apparatus produces a near-continuous gradient in irrigation water and soil salinity that can be used in highly replicated, rapid screening of crop or ornamental plants (or varieties or cultivars within a species) over a pre-determined range of salinity. This should greatly improve the assessment of salinity in range and crop land.

Digital soil mapping (DSM) quantitatively predicts the spatial distribution of soil classes, which informs land use and management decisions. Key components of DSM are the method and the environmental variables (covariates) used to predict soil classes. Machine learning comprises a broad set of statistical modeling techniques, and there are different approaches for selecting variables for DSM. However, there is little guidance as to which machine learning model and covariate set might be optimal for predicting soil classes in different landscapes. We compared multiple machine learning models and covariate sets for predicting soil classes at three geographically distinct areas in the semi-arid western USA. We compared models used in other DSM studies, including clustering algorithms, discriminant analysis, multinomial logistic regression, neural networks, tree based methods, and support vector machine classifiers. There were 3 model complexity groups: simple, moderate, and complex. We also compared 3 sets of covariates derived from digital elevation models and Landsat imagery: 1) covariates selected a priori by soil scientists familiar with each area and input into the model, 2) set 1 plus 113 additional covariates, and 3) covariates selected using recursive feature elimination. Complex models were more accurate than simple or moderate models. We recommend that complex models and covariates selected by recursive feature elimination be used for soil class prediction. Spatial predictions using the most accurate models generally agree with expected soil-landscape relationships, and uncertainty was lowest in areas of low relief.

UAES project findings thus far also show absentee landowners vary in terms of what influences their decision making on the land, and can be classified as either (1) solely interested in recreation, (2) interested in both recreation and conservation or (3) no major influences on their decision making. These groups have also been shown to vary in terms of what natural resource agencies they use for conservation outreach information. Little is known about how absentee land owners make conservation and active land management decisions. Most absentee owners in the studies reviewed are from urban areas, own land primarily for non-production oriented reasons, and are less likely to be engaged in active management. They exhibit a 'disinterest' in the land and are less likely to have experience with natural resource professionals. They appear to be less dependent financially upon the land and much more likely to own land for amenity reasons (e.g. recreation, vacationing) than production purposes. Absentee owners of rangeland are often affluent, purchase land for investment and recreation opportunities over productive reasons, and engage in what they deem 'environmentally-friendly' practices such as construction of ponds, not treating weeds, and increasing wildlife populations. These practices, however, result in detrimental environmental impacts (and subsequent social issues). Absentee owners differ from resident owners in regards to outreach, and new communication strategies need to be developed to better target the needs and concerns of absentee owners in order to promote sustainable forest and range management.

As the percentage of federal land managed for multiple use increases in western counties, growth rates of migration and income increase up to a point. Past this tipping point--at about 40-45% of federal multiple-use ownership, growth rates begin to slow. For state multiple-use ownership and management, growth rates fall as the percentage increases, until a tipping point is reached at about 15% of state multiple-use management. After that point, growth rates for migration, employment, and income begin to increase.

Water Wise Landscape Education

The Water Conservation District and the UCES 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. The Utah State University Extension Water Check Program focuses on the application efficiency of landscape irrigation systems and components by identifying and measuring irrigation flaws and inefficiencies. On average, Utahans participating in the Water Check Program save 25,750 gallons of water annually, reducing the amount of water applied to landscapes by 8 percent. By using plants more adapted to Utah's desert climate as researched by UAES, 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.

Water

Weber Basin Water Conservancy District (WBWCD) is using WaterMAPs (software developed through a UAES project) to track water use of 1000 secondary water users. Salt Lake City Public Utility supplied water use for two years for all their water users for USU to analyze. Agreement with Jordan Valley Water Conservancy District (JVWCD)to install our software to mine water billing data for capacity to conserve (WaterMAPS) on their server so that they can analyze capacity to conserve of their retail customers, and allow their customers to track improvement (reduction) in capacity to conserve. We are being successful in getting WaterMAPS in the hands of the major water agencies in Utah so they can begin to analyze capacity to conserve use by their customers. Analyzing customer water use patterns will allow water agencies to assess to what level they can push conservation and forestall development of new dams. For instance, WBWCD used WaterMAPS to determine that the trial study of metered secondary water users showed that reports to end users based on WaterMAPS reduced consumption, and that most are using water below their allotment of three acre-feet. Weber Basin (WB) is planning on renegotiating this excess allotment to recover about 600-800 acre-feet that can be used to meet future water needs. In Davis and Weber counties, WB plans to meter about 30,000 end users at the cost of upwards $100,000,000, and they will rely on WaterMAPS to justify that expense in recovering about 25,000 acre-feet. WaterMAPS also helped WB decide to forestall building new supply structures for the Bear River by five years.

A UAES project evaluated and compared three climate-based irrigation controllers for both water application amounts and related plant health and quality. Significant differences in total water application were observed, with the control tending to have higher values than the climate-based controllers. Differences in stomatal conductance of plant materials were also observed with plants in the Weathermatic® plots having the highest values on most days and plants in the Rainbird® plots having the lowest values. There were also differences in turfgrass quality and surface temperature observed on

certain days with the control plots tending to have the highest quality and lowest surface temperature. Soil volumetric water content differed across treatments and was less with the climate-based controllers than the control. Turfgrass quality and health were negatively impacted by the use of the climate-based controllers, but not to a degree that would prevent their use. All of the climate-based controllers tested saved water.

In agronomic settings (hay and forage crops), work has been focused on evaluating the efficacy of nutrient and manure management education provided though UCES. The response was summarized of growers consistent with best management practice education as reflected in the improvement of Phosphorus (P) levels in agricultural soils within the Beaver River watershed, known to be historically adversely affected by excess P contamination. The study covered a 10-year period, and showed that 12% of growers showed significant improvement in P management (reduced P loading above critical levels and improved P nutrition in deficient soils) over the study period.

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 2.5 million acres of private rangeland in Utah. The Association has saved Utah landowners over $4.5 million. The CWMU program generated over $40 million in new revenue for Utah landowners and provides free access to over 6,000 Utah hunters to high quality big game hunting opportunities.

Natural Resource Management

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, they 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. Together, results suggest that activated carbon (AC) needs to be at high concentrations (1 kg m-2) to increase native species growth and reduce invasives. In addition, AC effects can take years to have a measurable effect, and will not be measurable when there is little to no native plant establishment. Our greenhouse results suggest that native species have a greater response to AC treatments than non-native species. Soil carbon treatments had a minor effect on biomass or survival of established plants, but it did have a statistically significant effect on germination success and seedling establishment. In addition, the results suggest that AC effects are largely a result of AC causing changes in plant-microbe communication rather changes in allallelopathy. Results from this research highlight the importance of plant-microbe communication to plant growth and competition.

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.

Newly-completed analyses of data of Utah residents have revealed several important findings. First, it is clear that on the whole Utah residents do tend to exhibit NIMBY-type ("Not In My Back Yard") responses to utility-scale renewable energy developments. Although they express strong support for renewable energy in a general sense, that support is often withdrawn when respondents are asked to consider the prospect of having such facilities built in close proximity to their place of residence. Results of multivariate analyses revealed that overall beliefs about the opportunities or threats associated with renewable energy development play an important role in shaping both general renewable energy attitudes and willingness to accept the siting of wind and solar facilities in close proximity to one's residence. Those who believe these facilities provide more opportunities than threats typically express more supportive general attitudes about renewable energy, and greater willingness to have wind and solar facilities built in close proximity. This suggests that local support for the siting of renewable energy facilities can likely be increased through efforts to increase the range and magnitude of opportunities (such as job creation or production of new tax revenues) that large-scale renewable facilities might create for local communities and residents, while also working to decrease impacts (such as deterioration of viewshed quality) that tend to be perceived as threats. Multivariate results also indicated that having an "ecological worldview" plays an important role in shaping overall attitudes toward renewable energy. However, as the analysis moved from more general attitudes about renewable energy to the idea of having large utility-scale wind and solar facilities built in close proximity, the relationship involving respondents' ecological worldview changed. While our findings indicate that general renewable energy attitudes are related to environmentalism, it appears that reactions to the idea of having a utility-scale renewable facility built in close proximity move beyond personal environmental principles and are based on other, more situational, factors. Additionally, the analysis reveals a tendency for relatively few residents, regardless of their socio-demographic characteristics or worldviews, to think having these facilities in close proximity is a good idea. A logical implication of these findings is that efforts to secure public approval of large-scale wind and solar facility developments will be more likely to succeed if policies and regulatory guidelines are implemented to preclude facility siting in very close proximity to areas where residential land uses are already in place.

CHILDHOOD OBESITY, NUTRITION, AND COMMUNITY SUSTAINABILITY

Food Sense

Food Sense is Utah's Supplemental Nutrition Assistant Program - Education (SNAP-Ed). In Fiscal Year 2014 the program reached over 4,803 (unduplicated) adult participants and 20,191 (unduplicated) 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, SNAP-Ed low-income individuals reported eating more fruits and vegetables, eating more meals together as a family, and experienced less food insecurity after participating in SNAP-Ed.

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. During 2014 in Utah 63 of 64 companies reported impacts including $21,670,000 in increased sales and retained sales of $68,600,000. Cost savings amounted to $12,383,286. Total investment impact of MEP programming was $44,623,840. There were 1,062 jobs created or retained through the efforts of MEP.

Rural/Urban Preschool Programs (Baby Steps Project)

UAES analyses met the specific objective of assessing quality child care scores between rural/rural and rural/urban infant & toddler programs. The major findings were that although rural programs had the lowest quality, they were especially receptive to the training, at least during the first year of the Baby Steps program. Thus, quality scores improved for rural centers during the first year of treatment but not in any

subsequent years. The trend for urban centers was similar with improvements during the first year but not thereafter. An enormous amount of state/federal money has been poured into the 7+ year Baby Steps program but with extremely poor returns. Our study found few changes in quality after the first year in Baby Steps. The withdraw rate for Centers in both rural and urban areas from T1 to T7 was enormous (96%) and the yearly teacher turnover rate during the treatment period was greater than 62% overall. Teachers received the training intervention in Baby Steps, but the high teacher turnover rate has meant that training each year starts out with the basics in order to bring the new teachers up to speed. This leaves little time to discuss the more complex features of quality, a topic that would benefit the providers who have been in the field longer. All directors agreed the major barrier to quality was money for salaries and for center improvements. Most directors agreed that a second major barrier was hard work, both physically and mentally. A third barrier was lack of consumer awareness about child care quality.

Building and Maintaining Healthy Relationships

UCES implemented the 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. In addition 30 stepfamily and remarriage education classes were offered in 2014, serving 1,140 persons. 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.

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 and 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 for 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. 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.

Quantitative analysis of working conditions and worker attitudes revealed that workers in this region

experience significant unfair labor practices on the job and are more dissatisfied with their working conditions than workers nationally. Analysis also revealed that workers, irrespective of cultural background or political orientation, believe that stronger unions could effectively address these issues. This finding is important as it is often assumed that workers in conservative right-to-work states like Utah hold very strong negative attitudes toward labor unions.

Qualitative analysis revealed that the political climate in Utah is more supportive of migrant/immigrant workers than is often assumed. Employers and policy makers alike are committed to improving working conditions in the state in order to attract migrant workers. This finding is important because it undermines several assumptions about employers' views of immigrant workers, particularly in politically conservative states like Utah.

Qualitative analysis of social service providers revealed significant constraints on organizations' ability to support migrant/immigrant workers. These include state policies, organizational practices and workers' cultural attitudes. We have identified a number of ways that these obstacles might be overcome in order to better meet the needs of immigrant workers and their families in Utah.

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 demonstrate 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 194 IDA accounts for the matched-savings program. Since the program's beginning in Cache County, there have been 25 homebuyers who had IDA matched-savings to help them purchase their first homes equaling $3,392,959. In addition, $284,889 in post-secondary education dollars has been sent to USU to help cover tuition for IDA savers. Thirteen businesses have been expanded or started by IDA savers. 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 2014 tax season, taxpayers received Volunteer Income Tax Assistance via the Virtual VITA delivery model and the support of their local Extension office. In total the filers received $196,021 in federal and state refunds. It is estimated the taxpayers saved $30,384 in tax preparation fees. Partly due to training that USU extension has done for the IRS and other interested parties the concept has expanded on a national level. During the 2014 tax season about 17,038 returns were completed following the Virtual VITA model developed in Utah. If the benefits are similar to those seen in Utah it would mean that volunteers at these other locations helped qualifying taxpayers receive more than $39 million in refunds and save about $3.5 million in preparation costs.

Business, Entrepreneurship, and Rural Economic Development

USU Business Entrepreneurship and Rural Economic Development programs include eight SBA funded Small Business Development Centers at all USU campuses; four Business Resource Centers at Brigham City, Tooele, Roosevelt and Moab; a Micro-Business Center for refugees and veterans funded by the Department of Workforce Services project with Salt Lake County and Salt Lake Regional Campus; and the Development of Micro-Enterprise and Small Business Development Programs. The Business Resource Centers held successful business and economic development summits providing training for approximately 625 local businesses. All USU Extension SBDC offices hosted ""Utah's Own"" workshops sponsored jointly by USU and Utah Department of Agriculture and Food. Approximately 500 food entrepreneurs and businesses received training in how to uniquely market their products and services at these events. Extension USU SBDC and BRC centers have created an economic impact of $7,311,150 in small business capital infusion, $3,526,500 in sales increase, 122 new business starts, 398 jobs created or saved, and have assisted 1886 largely rural clients in 2014. This Extension network is largely unique to Utah and USU's commitment to applied business and community development.

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.

UAES research has unveiled important questions in regards to obesity, inflammation and iron regulation that further research could help answer. Despite a growing public perception that dietary omega-6 fatty acids are proinflammatory there is little data to support this assertion. Thus we created diets with different levels of fatty acids to explicitly test this assertion. As of now, our results do not support the idea that the EFA content of dietary fat does affect systemic inflammation.

Concerning the social impact of accepting SNAP benefited farmers markets in Utah, research has found that the majority of farmers' market managers reported that they did not know the total or monthly sales of the market for markets that accept SNAP (71.4%) and at markets that do not (80.0%). This finding contradicts previous studies, which reported on the success of SNAP on sales for markets in New York, North Carolina, Minnesota, and Pennsylvania (Blue Cross and Blue Shield Association, 2011; Olmsted County Public Health Services, 2012). The U.S. Department of Agriculture reported that 65.4% of farmers' market managers surveyed (n = 428) indicated that their total annual sales were greater than $25,000 in 2011 (United States Department of Agriculture, 2013). The study further reported that one-third of the respondents received (34.1%) over $100,000 dollars in 2011, and 15.3% reported total sales of less than $500. Findings from the follow-up study indicate that there is room for improvement in the record keeping of farmers' markets in Utah. These numbers are vital in determining the success of the program and the impact of accepting SNAP benefits on the sales of farmers' markets. Managers whose farmers' markets do not currently accept SNAP benefits reported barriers to accepting SNAP benefits were the ongoing transaction fee, additional bookkeeping, and extra work to accept SNAP. This finding was interesting as

many farmers' markets indicated that they purchased machines capable of accepting SNAP benefits with help from grants from other organizations. Respondents indicated that SNAP acceptance at farmers' markets had a large social impact for the Utah community. Managers of farmers' markets that already accept SNAP agreed that accepting SNAP promoted access to healthy food in the community, supported the local economy, and improved the market's public image. Ten of the farmers' market managers felt a strong sense of community when they are at the market, while four market managers felt some sense of community. One market manager was neutral to feeling a sense of community when at the market. One manager whose market accepts SNAP was very satisfied with the market's profitability, while three managers were satisfied. Three managers at farmers' markets accepting SNAP were neutral about the market's profitability, and one manager was dissatisfied.

Our efforts in 2014 focused around the development and pilot testing of an intervention called Fit Game, which shared some similarities to the Food Dudes program, but required less resources and time to run in schools. In 2014 we tested the hypothesis that the Fit Game, a program that required little to no resources from schools to run, could motivate children to consume more fruits and vegetables at school. This was tested in three schools, Edith Bowen (spring of 2014) and Bridger and Ellis (fall 2014). We found that at Ellis elementary fruit intake increased by 33% (from an average of 60 grams to 80 grams per child) and vegetable intake increased by 133% (from an average of 18 grams to 42 grams per child). Results were similar for Edith Bowen, but we did not observe increases at Bridger elementary. We believe the null results observed at Bridger elementary were due to the fact that the placement of the intervention material in the cafeteria was difficult to see for some students. In addition, we examined associations between observations of children's fruit and vegetable intake at school and their reported intake of fruits and vegetables at home in an effort to better understand how dietary behaviors at school may influence dietary behaviors at home. In this sub-study of 33 students, we found that when fruit and vegetable intake increased at school during our intervention (fruit intake increased by 87% from 0.16 cups to 0.31 cups; vegetable intake increased by 53% from 0.15 cups to 0.23 cups), there was no change in fruit or vegetable consumption at home. This suggests that school fruit/vegetable consumption is not replacing old fruit/vegetable consumption. Students who had previously participated in the Food Dudes intervention were consuming higher levels of fruits and vegetables at the end of their 6th grade year than were 6th grade students who had not previously participated in the school lunch program (0.78 cups vs. 0.50 cups).

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. In rural areas access to education and exams is limited. 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. Extension's Food Safety Manager Certification made it possible for 625 managers to receive training and complete a certification exam close to their home.

Total Actual Amount of professional FTEs/SYs for this State

Year: 2014	Extension		Research	
	1862	1890	1862	1890
Plan	110.0	0.0	65.0	0.0
Actual	90.0	0.0	48.5	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-reviewed process within 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 off-campus to qualified subject matter experts is used approximately 10%-15% of the time.

Utah Cooperative Extension Service: The cooperative extension service merit review process involves a review by the University of Wyoming, University of Arizona, and the University of New Mexico extension services. These institutions will review the program components suggested in each program area utilizing extension faculty qualified as specialists with significant program experience in the area being reviewed. In turn, Utah State University Cooperative Extension Service will review the work from these three institutions.

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

Brief explanation.

Media sources are frequently used by Utah counties to encourage county residents to participate in public meetings and listening sessions. Use of local newspaper and radio resources

through public service announcements and paid advertisements are the two primary techniques applied in media use. Counties target 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 traditional audiences. Non-traditional stakeholder groups are also specifically invited to participate in public meetings and listening sessions through various public and private invitations. Inviting individual stakeholder and non-traditional stakeholder individuals to participate in public meetings and listening sessions is also a significant means of engaging them in discussions. Surveys serve as another means for contacting stakeholders, traditional and nontraditional. 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. Advisory groups, both at the county and university levels, are utilized in obtaining stakeholder input.

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 used many of the same advisory groups used by Extension that meet as needed to provide critical input from public and private sectors. Listening groups with key constituents were also utilized. Utah Extension utilized advisory committees as the primary means of identifying stakeholder individuals and groups to collect program input. Council and advisory groups utilized groups, such as teen councils, horse and livestock councils, Workforce Services, Interagency Coalitions, community religious leaders, United Way, Utah State Advisory Boards, Utah Fair Boards, Utah Farm Bureau and Farmers Union Boards, afterschool coalitions and previous recipients of Extension programs were also utilized. Counties used focus groups and open listening sessions as means to identify group and individual stakeholders. Needs assessments and surveys provided another primary means of identifying individuals and groups.

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.

Input received from stakeholders has been utilized 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. These inputs frequently inform Extension by influencing recruitment and hiring practices and the informing Extension on the types of applied research stakeholders perceive as critical to their need. The Experiment Station uses stakeholder input provided by Extension and advisory groups to change 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. Operating and graduate student funds go with those newly funded faculty positions.

3. A statement of how the input will be considered

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

Brief explanation.

The input received from stakeholders was utilized 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. These inputs informed Extension through influencing recruitment and hiring practices and on the types of research that stakeholders perceive as critical to their need. The Experiment station used stakeholder input provided by Extension and advisory groups' input to make changes in the research program through alternative funding measures and new faculty hiring. 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 still tied to specific program areas although they are interested in all programs offered through USU Extension and the Experiment Station. Information related to 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. Production and marketing issues are still critical to agricultural producers and require both Extension and the Experiment Station resources. The economics of various new technologies or production techniques continue to be important research topics for the Experiment Station and Extension. 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, to a lesser extent, the Experiment Station. Families and individuals are in need of food and finance programming which require both Extension and Experiment 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 and climate information value these services and want them to continue. The Experiment Station is involved in a host of research issues related to natural resources and the environment including climate change, public lands, water resources, urbanization of productive farmland, etc. -- all areas of critical importance to the citizens of the state of Utah. We have discovered that 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. Individual members of the public are always concerned as to why their important issues are not the highest priority with Extension and the Experiment Station, not realizing that there are inadequate resources to support all needed help. As a system, we understand that we cannot be all things to all people.

IV. Expenditure Summary

1. Total Actual Formula dollars Allocated (prepopulated from C-REEMS)			
Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
1740476	0	2360289	0

2. Totaled Actual dollars from Planned Programs Inputs				
	Extension		Research	
	Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
Actual Formula	1740476	0	2310637	0
Actual Matching	1740476	0	4117801	0
Actual All Other	0	0	11385073	0
Total Actual Expended	3480952	0	17813511	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

S. No.	PROGRAM NAME
1	Global Food Security and Hunger
2	Climate Change and Natural Resource Use
3	Sustainable Energy
4	Childhood Obesity, Nutrition and Community
5	Food Safety

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	0%		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	48%		5%	
211	Insects, Mites, and Other Arthropods Affecting Plants	8%		2%	
213	Weeds Affecting Plants	4%		5%	
215	Biological Control of Pests Affecting Plants	0%		5%	
216	Integrated Pest Management Systems	8%		5%	
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	0%		3%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2014	Extension		Research	
	1862	1890	1862	1890
Plan	44.0	0.0	22.0	0.0
Actual Paid	30.3	0.0	22.0	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**
484124	0	1187626	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
484124	0	1190300	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
0	0	5338670	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

1. Conducted research experiments with livestock and plants and plant material.
2. Published studies and make presentations related to plant propagation and livestock reproduction and actual plant and livestock production.
3. Conducted 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. Provided new methods of livestock pest control and disease prevention.
5. Released new plant varieties relative to this program area under plant variety protection (PVP) status.
6. Expanded use of Integrated Pest Management (IPM).
7. Provided 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. Coordinated efforts with other states and the Western Region Pest Management Center (WRPMC).
9. Enhanced the USU Master and 4-H Junior Master Gardener Programs.
10. Utilized multiple demonstrations/applied research plots to manage weeds in agronomic crops with results reported at field days, workshops, or annual meetings.
11. Conducted research experiments and developed theories that can be used to enhance plant and animal productive efficiencies through the use of genomics.
13. Conducted workshops and meetings for other scientists involved in this area of research.
14. Developed applications for the research on plant and animal genomics to directly benefit producers, youths, and other scientists.
15. Conducted market tests to determine the price premium associated with alternative production and marketing programs.
16. Built models to quantify the impacts associated with international trade.
17. Developed risk reduction models for agricultural producers.
18. Analyzed firm-level decisions to identify specific changes that might be made on individual farms and ranches that would enhance net returns.
19. Provided 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 are other scientists, agricultural producers, landscapers, the 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?

eXtension was used in 10% of UCES programs.

V(E). Planned Program (Outputs)

1. Standard output measures

2014	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	15834	641368	8003	324167

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

Patent Applications Submitted

Year: 2014

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2014	Extension	Research	Total
Actual	0	58	58

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of Patent Applications Submitted
  Not reporting on this Output for this Annual Report

Output #2

Output Measure

- Number of Peer Reviewed Publications
  Not reporting on this Output for this Annual Report

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	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
2014	36884

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Farmers and ranchers facing limitations due to illness, injury, or disability often find it difficult to remain in agriculture. This program provides education, and technical assistance on modifications and assistive technology devices to help them remain in agriculture.

What has been done
AgrAbility of Utah is currently assisting a total of 72 clients and their families that are facing limitations due to injury, illness, or disability. Through on-site farm and home assessments, AgrAbility of Utah develops individualized plans that help producers and their families facing a disability remain in agriculture. These plans often involve working with other agencies/organizations (e.g., Vocational Rehabilitation) to help them obtain funding for needed assistive technology.

Results
To date, AgrAbility of Utah, has helped over 230 agriculturalists and their family members remain in agriculture.

4. Associated Knowledge Areas

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

203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
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

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
2014	15322

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Livestock and livestock products comprise over 70% of the agricultural cash receipts in Utah. While the main focus of this planned program is animal nutrition and animal management systems, other, often diverse, knowledge areas are also associated with this planned program area. With such a large proportion of agricultural receipts coming from livestock, it is imperative that research and educational efforts be directed toward solving some of the major problems associated with livestock: reproduction rates, rates of gain, health, and environmental concerns.

What has been done
A significant portion of the state's and region's agricultural complex. We have continued work in (a) development of new grain, grass, and alfalfa varieties to help the livestock sector to remain economically viable and to do so in an environmentally friendly manner and (b) have expanded

the use of "native" landscapes in urban settings. We have developed plant materials that are ideally suited to the Intermountain region's climate through breeding, management, and genetic assessments and programs. We continue our work in genomics, as well as in the economic analyses critical to the adoption of various production and conservation practices, including both local markets and international trade.

Results

Production gains of commodities through research and outreach have increased milk, alfalfa, barley and wheat production between 2% and 5%. Significant advances have been made in identifying diseases, as well as economically important traits of livestock through our genomics work. Work has advanced in the identification of diseases of animals and in medical use of animals as models for humans.

4. Associated Knowledge Areas

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

There are many factors influencing our ability to follow through on the goals set herein. Economic conditions are still somewhat subdued. Stable budgets have occurred as the state's economy continues to adapt to new world economic realities. County-level budgets remain the same over the short term. Competing public priorities (primarily social programs, public health, and particularly prisons) have impacted budgets to CES and UAES. The composition of the state's population continues to change, with a higher immigration and in-migration of Individuals outside traditional groups. This has brought about evolving goals and program areas, particularly with respect to Hispanic and displaced international populations. Technology has changed ways previously thought not possible, with much more being done online in interactive settings. Government regulations and public policy changes have continued to have an significant impact on how many of our stated goals can be achieved. In short, external factors have had a more significant impact on our ability to deliver science-based information than any time in the recent past.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Utah Cooperative Extension System (UCES) programs are viewed as being successful by the vast majority of program participants. Utah Agricultural Experiment Station (UAES) programs are typically not viewed as being separate from UCES programs. In one sense, this is a good result as the public feels they can come to the College of Agriculture Applied Sciences to get answers to their questions without being concerned about which unit the answer will come from. The primary difficulty with the lack of separation in identities is that it is sometimes difficult getting the legislature to understand which primary function is associated with each unit as each unit is funded separately. Each activity is typically evaluated using one or more of the various means identified above. This information is used to strengthen both the UCES and UAES programs. Specific evaluation results are associated with each activity and it is not possible summarize the results of each of those activities in this reporting space.

Key Items of Evaluation

UCES programs, and UAES programs by association, are viewed as successful by more than 90% of program participants. Between 3% and 5% of attendees are dissatisfied on the average, with the remaining portion being neutral. Of course this percentage varies according to each specific planned program. As an example, more than 93% of the participants in the local food marketing program have adopted practices consistent with sustainable agricultural programs and have improved profits by 8%. As another example, more than 90% of the participants in beef improvement programs have adopted critical additional management skills have improved production and profits by more than 2%. The adoption of recommendations made by UCES and UAES scientists by fruit tree producers have increased fruit production by more than 3% and have reduced pesticide applications by approximately 12%. Improvements in dairy health programs have reduced mastitis on producers' herds by more than 10%, with improved identification practices, processes or tests being adopted by more than 55% of dairy herd producers.

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	15%		10%	
112	Watershed Protection and Management	22%		10%	
121	Management of Range Resources	9%		5%	
123	Management and Sustainability of Forest Resources	5%		3%	
132	Weather and Climate	0%		20%	
201	Plant Genome, Genetics, and Genetic Mechanisms	0%		15%	
205	Plant Management Systems	26%		15%	
213	Weeds Affecting Plants	1%		5%	
307	Animal Management Systems	0%		10%	
605	Natural Resource and Environmental Economics	22%		7%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2014	Extension		Research	
	1862	1890	1862	1890
Plan	12.0	0.0	24.0	0.0
Actual Paid	11.7	0.0	16.0	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**
240877	0	565084	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
240877	0	566444	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
0	0	3879845	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

1. Continued 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. Educated the public with respect to the principle causes of air pollution and their role in prevention.
3. Partnered with others to enable agriculture producers to meet EPA requirements.
4. Established herbicide demonstration/research plots to evaluate the efficacy of these products under local conditions.
5. Conducted projects consultations, and workshops focusing on the role of outdoor recreation and natural resource-based tourism in relation to community development.
6. Partnered with others in education and use of resources to rehabilitate the sagebrush steppe environment.
7. Educated and partner to enable the recovery of the sage grouse, pygmy rabbit and others to avoid listing as endangered species.
8. Determined 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. Educated 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. Educated the public on responsible use and the value of multiple uses on rangelands.
11. Illustrated the need for management and control of pinion-juniper forests to restore watershed, wildlife habitat and forage values on rangelands.
12. Educated the public regarding various options with respect to adapting to global climate change.
13. Provided information to landowners and users on grazing management of grazeable lands.
14. Partnered 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. Conducted experiments and develop theories that can be used to enhance water, soil, wildlife, and for various agronomic and urban areas.
16. Published studies relating to this program area.
17. Provided 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?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2014	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	649	102073	0	0

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

Patent Applications Submitted

Year:	2014
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2014	Extension	Research	Total
Actual	0	38	38

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of Patent Applications Submitted
  Not reporting on this Output for this Annual Report

Output #2

Output Measure

- Number of Peer Reviewed Publications
  Not reporting on this Output for this Annual Report

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	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
2014	6218

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
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. 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 the overall effectiveness of wildlife management.

What has been done
To address these issues in Utah USU 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 landowners encompassing over 2.5 million acres of private rangeland in Utah. Currently about 70% of all registered CWMU's in Utah are a member of the Association. It provided members with information, education, technical support, and policy guidance to enhance wildlife management, recreational opportunities, and alternate income potentials on private land.

Results
In 2014, the Cooperative Wildlife Management Unit program generated over $40 million in new revenue for Utah landowners and provided free access to over 6,000 Utah hunters annually to high quality big game hunting opportunities.

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
2014	5024

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
At home Utahans use nearly two-thirds of their water irrigating lawns and landscapes. Water officials know that at least 30% of that water is being wasted.

What has been done
The Utah State University Extension Water Check Program is a Wasatch-Front based effort to assist homeowners, commercial property managers, and institutions with efficient landscape irrigation management. The program focus on the application efficiency of landscape irrigation

systems and components by identifying and measuring irrigation flaws and inefficiencies.

Results
On average, Utahns participating in the Water Check Program save 25,750 gallons of water annually, reducing the amount of water applied to landscapes by 8 percent.

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

{No Data Entered}

V(I). Planned Program (Evaluation Studies)

Evaluation Results

{No Data Entered}

Key Items of Evaluation

{No Data Entered}

V(A). Planned Program (Summary)

Program # 3

1. Name of the Planned Program

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%		50%	
402	Engineering Systems and Equipment	30%		25%	
403	Waste Disposal, Recycling, and Reuse	70%		25%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2014	Extension		Research	
	1862	1890	1862	1890
Plan	1.0	0.0	1.4	0.0
Actual Paid	0.2	0.0	0.5	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**
7311	0	0	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
7311	0	0	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
0	0	168546	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

1. Conducted research into alternative biofuels and methods of production that are well-suited for the Intermountain West.
2. Published in peer-reviewed journals and other professional outlets.
3. Took the research that is done and adapted that research so useful practical strategies might be followed in producer biofuels to the extent they were 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 primarily directed towards extension specialists, county agents, and other scientists; the extension 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?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2014	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	39	188	19	91

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

Patent Applications Submitted

Year:	2014
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2014	Extension	Research	Total
Actual	0	4	4

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of Patent Applications Submitted
  Not reporting on this Output for this Annual Report

Output #2

Output Measure

- Number of Peer Reviewed Publications
  Not reporting on this Output for this Annual Report

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	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
2014	164

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
For experiment station faculty their target audiences are geared primarily towards extension specialists, county agents, and other scientists. The extension 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.

What has been done
On the genomics level, work is been done on lactic acid in the potential of lactic acid to provide an alternative energy source. Work was also done on examining the potential for biomass co-firing using straw and similar products.

Results
While there may be some commercial potential, it will be sometime in the future before any technology can be developed commercially. As far as co-generation using wheat straw is concerned, electrical prices would have to rise significantly, as would carbon prices, in order to justify assembling and co-firing of straw or related materials.

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

Not Reporting on this Outcome Measure

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

Everyone of the areas checked above has had a significant effect on the development of sustainable energy. With the discovery of major sources of natural gas in the US, and even additional oil, it is unlikely that sustainable energy development will occur without heavy subsidization. Unless there is a change in technology or policy which allows for affordable sustainable energy production, this will not be an area that is heavily invested in by UCES or UAES. In addition, we would have a difficult time competing with other entities who are putting a major effort in this area.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

We do not have evaluation results in this area, though there are a limited number of peer-reviewed citations USU faculty have been able to publish in this area.

Key Items of Evaluation

Nothing to note.

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	8%		10%	
702	Requirements and Function of Nutrients and Other Food Components	0%		35%	
703	Nutrition Education and Behavior	8%		5%	
724	Healthy Lifestyle	3%		5%	
801	Individual and Family Resource Management	15%		10%	
802	Human Development and Family Well-Being	8%		5%	
803	Sociological and Technological Change Affecting Individuals, Families, and Communities	5%		25%	
806	Youth Development	53%		5%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2014	Extension		Research	
	1862	1890	1862	1890
Plan	56.0	0.0	11.5	0.0
Actual Paid	44.8	0.0	7.0	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**
941375	0	358482	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
941375	0	358901	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
0	0	1385888	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?

eXtension was used??

V(E). Planned Program (Outputs)

1. Standard output measures

2014	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	24959	2767216	33582	3723253

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

Patent Applications Submitted

Year:	2014
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2014	Extension	Research	Total
Actual	0	26	26

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of Patent Applications Submitted
  Not reporting on this Output for this Annual Report

Output #2

Output Measure

- Number of Peer Reviewed Publications
  Not reporting on this Output for this Annual Report

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	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
2014	17560

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Research shows that many diseases and other health problems have much to do with what we eat, and could possibly be prevented by change in eating and other health habits. Child obesity is on the rise, which will only bring more health problems in the future. Many individuals know of the need to eat more healthfully, but have not translated that need into simple tasks to make it happen. Informing about ways to eat more healthfully to prevent obesity and other diseases, and ways to prepare quick and nutritious meals will empower individuals to make healthier choices.

What has been done

Food Sense (SNAP-Ed) serves individuals who are either food insecure or at risk for food insecurity. In 2014, the Food Sense (SNAPEd) program directly educated 4,803 adults and 20,191 youth in Utah and was present in all 29 counties across the state. In addition, the Food Sense (SNAP-Ed) program indirectly educated another 233,237 Utahans through county fairs, health fairs, posters, websites, blogs, and more. This was all done as a result of the committed support from USDA's Food and Nutrition Services (FNS), Utah's Department of Workforce Services (DWS), and Utah State University. Group classes for adults and youth are the core of the Food Sense (SNAP-Ed) program in Utah. These classes address the specific needs of participants and provide nutrition education as outlined in the current USDA Dietary Guidelines and MyPlate.

Results

In 2014, the Utah State University Food Sense (SNAP-Ed) program, known nationally as the Supplemental Nutrition Assistance Program (SNAP-Ed) assisted thousands of Utah families in making healthy food choices on a limited budget.

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
2014	7034

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
According to a 2012 USDA report, 14.6% of Utahans were "food insecure" , indicating that they worried about where their next meal would come from. A study by Lisboa Associates reported that less than half of low-income households use foods that provide an ample supply of important nutrients. Another study pointed out that over two thirds of Food Stamp program households have health related problems related to sodium consumption, cholesterol intake, high sugar, and being overweight.

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

2014 Food Sense follow-up data showed that 43% of respondents were participating in SNAP and other assistance programs. Eight percent of adult participants reported never/seldom having enough food to last through the month after participating in Food Sense compared to 27% prior to receiving education. Eigthy-three percent reported usually/always eating meals together as a family at least three time per week compared to 67% prior to receiving education. Sixty-two percent reported usually/always eating at least 2 cups of vegetables per day compared to 31% prior to receiving education. Sixty-five percent of adult participants reported usually/always eating at least 2 1/2 cups of fruit per day compared to 31.5% prior to receiving Food Sense education. Youth participating in Food Sense education increase the likelihood they will try vegetables again in the future, usually/always improve their diet by following MyPlate recommendations, increase their physical activity, and follow the USDA food safety recommendations when preparing and cooking food.

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
2014	10200

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The recent recession raises greater awareness of the importance of personal and family money management skills. According to 2013 statistics Utah ranks 6th in bankruptcy filings. A better understanding of personal finance will help participants make more informed financial decisions.

What has been done
Extension provided financial management education to 2,940 participants through workshops and classes taught by Extension County faculty. Some of the topics included Teaching Kids about Money; Distribution of Personal Property; Identity Theft; Managing Transportation Costs; Budget Like a Pro; Financial Management for Seniors; Smart Money Moves; and Military Saves.

Results
Utah residents have sharpened their financial management skills by participating in a variety of classes. 251 completed education required to apply for an Individual Development Account (matched savings account), 660 piloted the new Change Makes Sense curriculum, and 2030 learned about everything from basic budgeting to estate planning.

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
2014	4313

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
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 that many small industrial firms are not improving their manufacturing performance.

What has been done
Priorities for this program come from a strategic focus on Utah's small manufacturers and on Utah's supply chain linkages. Priority to service delivery was given to those objectives that best conform to the mission of the Manufacturing Extension Program, which is; "To raise the competitiveness, performance, and profitability of Utah's manufacturers".

Results
The following are Impacts for 2014: Number of Companies reporting Impacts = 63 of 64, Sales Increases = $21,670,000, Retained Sales = $68,600,000, Jobs Create/Retained = 1062, Cost Savings = $12,383,286, Total Investment = $44,623,840

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

Every one of the above checked factors had a negative impact on this program area! The economy has slowly improved over the last one to two years, but a large share of the increase has been in the area of technology.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Many of the programs offered through Extension were participant self-evaluations where results are used to document impacts. Evaluations in 2014 of some extension programs falling under the Childhood Obesity, Nutrition, and Community included Food Sense (SNAP-Ed) nutrition, Couples and Money Workshops, Relationship Workshops, Utah Prepare Fair, farm-chef-fork programs, and 4-Hit (Information Technology).

Key Items of Evaluation

In 2014 we tested the hypothesis that the Fit Game, a program that required little to no resources from schools to run, could motivate children to consume more fruits and vegetables at school. This was tested in three schools, Edith Bowen (spring of 2014) and Ellis (fall 2014). We found that at Ellis elementary fruit intake increased by 33% (from an average of 60 grams to 80 grams per child) and vegetable intake increased by 133% (from an average of 18 grams to 42 grams per child). Results were similar for Edith Bowen. We found that when fruit and vegetable intake increased at school during our intervention (fruit intake increased by 87% from 0.16 cups to 0.31 cups; vegetable intake increased by 53% from 0.15 cups to 0.23 cups; p-values <0.01), there was no change in fruit or vegetable consumption at home (p>.5).
Earnings reported by students who earned the Utah FFA Degree and the American FFA degree in 2011 and in 2013, as measured in 2014, showed an increase in the economic

impact of supervised agricultural experience programs and entrepreneurial education. In 2011, students earning the Utah FFA Degree and the American FFA degree reported earnings of $3,378,783. In 2013, students earning the same two awards earned $3,992,027, representing an increase of 18.1% over the two year time period. This demonstrates that there is value in the FFA program, though certainly other factors also impacted earnings.

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
311	Animal Diseases	0%		10%	
501	New and Improved Food Processing Technologies	0%		10%	
502	New and Improved Food Products	32%		10%	
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	68%		0%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2014	Extension		Research	
	1862	1890	1862	1890
Plan	2.0	0.0	12.6	0.0
Actual Paid	2.6	0.0	2.9	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**
66789	0	199445	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
66789	0	2002156	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
0	0	612124	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?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2014	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	460	61476	1562	147275

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

Patent Applications Submitted

Year:	2014
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2014	Extension	Research	Total
Actual	0	22	22

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of Patent Applications Submitted
  Not reporting on this Output for this Annual Report

Output #2

Output Measure

- Number of Peer Reviewed Publications
  Not reporting on this Output for this Annual Report

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	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
2014	10463

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Utah law requires that each business that prepares and serves food have a certified food safety manager. In rural areas access to education and exams is limited.

What has been done
The USU Extension offices served as a liaison for the Food Safety Manager Certification program. The offices answered questioned for customers, connected them with the Food Safety web site, and proctored exams for food service managers.

Results
Extension's Food Safety Manager Certification made it possible for 625 managers to receive training and complete a certification exam close to their home.

4. Associated Knowledge Areas

KA Code	Knowledge Area
311	Animal Diseases
501	New and Improved Food Processing Technologies
502	New and Improved Food Products
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 Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	6384

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Bacteria and other air particles can grow on food if not preserved accurately. These particles can grow into food-borne illnesses that can spoil food, inflict illness in individuals who eat the food, or even cause death in severe cases.

What has been done
Canning and food storage classes attracted 1,836 participants last year. Over 550 pressure canner gauges were checked for safety and 63 volunteers were trained as Master Food Preservers.

Results
This service possibly prevented botulism for these consumers and their families.

4. Associated Knowledge Areas

KA Code	Knowledge Area
311	Animal Diseases

501	New and Improved Food Processing Technologies
502	New and Improved Food Products
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

Every one of the above checked factors has had a negative impact on this program area. The economy has shown some improvement over the last year or two but is not yet back to work was..

V(I). Planned Program (Evaluation Studies)

Evaluation Results

In the Baby Steps program, all directors agreed the major barrier to quality was money for salaries and for center improvements. Most directors agreed that a second major barrier was hard work, both physically and mentally. A third barrier was lack of consumer awareness about child care quality.
The research on compressed natural gas (CNG) found that the proportion of the passenger vehicle fleet likely to adopt CNG vehicles is small even if technology improvements allow for very low conversion costs or manufacturer vehicle price differentials. However, we also find that 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 that 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.
In attempting to determine whether or not private or local brand designations influence shopping habits, results from the sensory analysis and stated preference survey results suggest that local food designations have real value in terms of willingness to pay by consumers for ice cream if products are of high quality. Not all locally branded products

will have this characteristic.

Key Items of Evaluation

Nothing specifically to note.

VI. National Outcomes and Indicators

1. NIFA Selected Outcomes and Indicators

Childhood Obesity (Outcome 1, Indicator 1.c)	
0	Number of children and youth who reported eating more of healthy foods.
Climate Change (Outcome 1, Indicator 4)	
15	Number of new crop varieties, animal breeds, and genotypes whit climate adaptive traits.
Global Food Security and Hunger (Outcome 1, Indicator 4.a)	
3500	Number of participants adopting best practices and technologies resulting in increased yield, reduced inputs, increased efficiency, increased economic return, and/or conservation of resources.
Global Food Security and Hunger (Outcome 2, Indicator 1)	
5	Number of new or improved innovations developed for food enterprises.
Food Safety (Outcome 1, Indicator 1)	
5	Number of viable technologies developed or modified for the detection and
Sustainable Energy (Outcome 3, Indicator 2)	
0	Number of farmers who adopted a dedicated bioenergy crop
Sustainable Energy (Outcome 3, Indicator 4)	
0	Tons of feedstocks delivered.