

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

Status: Accepted

Date Accepted: 05/21/2013

I. Report Overview

1. Executive Summary

New Mexico (NM) agriculture must remain competitive in U.S. and world markets. This requires a continuous flow of appropriate technology addressing local needs within New Mexico. It is critical that the College maintains and strengthens programs that address these needs. The College recognizes that agricultural competitiveness and efficiency should take into account social and environmental costs. Determining these factors requires a coordinated, team approach within the College and among researchers and Extension faculty.

New Mexico Cooperative Extension has a tremendous role in helping to keep New Mexico's agricultural economy strong particularly in light of international border competition issues. Drought and water disputes, use of expansive range lands, invading diseases and pests, and national economic downturns, all play a role in maintaining, retaining and building New Mexico's agriculture infrastructure. Extension specialists and agents are working toward resolving conflicts through researched solutions, mediation through involvement of clientele in problem solving, incorporation of technology applications whenever feasible, and continuous reintroduction of tried and true practices.

New Mexico is continuing work to ensure an adequate and safe food and fiber system. Researchers continue to address promotion of regulatory compliance, product process development, food safety (contamination and protection) and sanitation, and marketing of specialty food products. Target audiences include clientele in nearly every county along with Native American meat processors and many farmers' market groups. A challenge in programming is to deliver the same basic message at several different levels of complexity to non-technical audiences, multicultural, and multilingual populations, as well as scientists and industry clientele. Research and education complement each other in the on-going efforts to control and reduce the introduction of pathogens into the food supply. While researchers are constantly seeking ways to reduce or eliminate contamination in the production and processing of food products, extension personnel are working with food handlers to ensure the safe delivery of food and food products from farm to consumer.

Even though New Mexico has a strong agricultural based economy, hunger issues persist for children and families. Extension efforts will continue to focus on improving the accessibility of food that is nutritious, safe, culturally acceptable, and affordable in both rural and urban areas. Food safety and security outreach will include strategies and programs aimed at both consumer and producer education. Extension specialists, agents and educators will continue to implement food safety programs targeted to food managers and handlers, as well as to home food and specialty farm producers and consumers.

A healthy, well-nourished population can be a consequence of access to, safe processing of, and delivery of nutritious foods particularly in households that are economically and nutritionally at risk. Even though agricultural and commercial advances have resulted in abundant food at ever-lower prices, many New Mexico households continue to face obstacles in securing a healthy, well-nourishing diet.

Barriers include a lack of resources and a limited understanding of nutrition. New Mexico State

University (NMSU) works annually on strengthening food and nutrition programs and doing research designed to alleviate barriers and improve the nutrition, well-being, and food security of NM citizenry. Agricultural Experiment Station researchers address the research needs of the agricultural products grown in NM. Cooperative Extension faculty deliver food preparation and nutrition education programs. In this tricultural state, not all households choose to consume food in accordance with dietary recommendations nor is regular exercise part of a daily or weekly routine (47.2% are inactive). In recent years, the focus of nutrition and health policy has shifted, because for many Americans, the problem is now one of overconsumption of certain foods or components. In fact, 4 of the top 10 causes of death in the United States are associated with diets that are too high in calories, total fat, saturated fat, or cholesterol or too low in dietary fiber. Improvements in diet and health can reduce illness and productivity losses, improve educational attainment, and prevent premature death. Solutions center on education to improve consumer understanding, behaviors, and food choices. New Mexico has a rich and diverse land and natural resource base that is arid and semiarid and, in many respects, extremely fragile. This natural resource base is a major contributor to the economic well-being of the state's residents. Its economic uses result in demands for various resources. In addition to direct demands for land and water, there is increasing pressure for recreation-related activities that represent a growing economic opportunity. Activities related to the state's natural beauty and its wildlife make a major contribution to the economy. The potential to develop, manage, and protect natural resources needs to be encouraged.

Both rural and urban human activities can pollute land, water, air, and food. Through teaching, research, and Extension programs, the New Mexico State University College of Agriculture and Home Economics is committed to furthering our understanding of human impact on the environment, and to supporting environmentally-sound agricultural and natural resource practices. The College will continue its efforts to understand the interaction between the environment and production agriculture. New Mexico's future is increasingly tied to regional environments and a global economy. Clearly defined regional and international perspectives are essential for the programs of the College. The University's traditional programs can be enriched by regional and international components and thereby better achieve their full potential.

International activities enhance global understanding incorporating international dimensions into the ongoing instruction, research, and Extension efforts of the College. Graduates of the College need an education that will allow them to achieve success in a global economy. They must have the skills necessary to keep New Mexico a supplier of food and fiber throughout the world and keep New Mexico a destination for tourists from around the world.

Economic opportunity and quality of life vary greatly for New Mexican. New Mexico still suffers from some of the highest statistics nationally relative to families with children poverty levels, per capita retirement incomes, numbers of high school graduates, illiteracy, crime, unemployment in rural communities, teen-pregnancy, and uninsured motorists among other unsatisfactory figures. Addressing the quality of life issues is a core piece in New Mexico Extension's educational effort.

Total Actual Amount of professional FTEs/SYs for this State

Year: 2012	Extension		Research	
	1862	1890	1862	1890
Plan	38.5	0.0	61.0	0.0
Actual	23.4	0.0	56.4	0.0

II. Merit Review Process

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

- Internal University Panel
- External University Panel
- External Non-University Panel

2. Brief Explanation

Projects are reviewed by faculty of the College of Agricultural, Consumer and Environmental Sciences. When necessary or appropriate, we have faculty from outside our college review projects.

III. Stakeholder Input

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

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

Brief explanation.

See above checklist.

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

1. Method to identify individuals and groups

- Use Advisory Committees
- Use Internal Focus Groups
- Use External Focus Groups
- Open Listening Sessions
- Needs Assessments
- Use Surveys

Brief explanation.

See above checklist.

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

Brief explanation.

See above checklist.

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.

See above checklist.

Brief Explanation of what you learned from your Stakeholders

National priorities often are not aligned with state needs and priorities.

IV. Expenditure Summary

1. Total Actual Formula dollars Allocated (prepopulated from C-REEMS)			
Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
2053991	0	2048829	0

2. Totaled Actual dollars from Planned Programs Inputs				
Extension			Research	
	Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
Actual Formula	2270622	0	4975446	0
Actual Matching	2072172	0	4975446	0
Actual All Other	0	0	0	0
Total Actual Expended	4342794	0	9950892	0

3. Amount of Above Actual Formula Dollars Expended which comes from Carryover funds from previous				
Carryover	{No Data Entered}	{No Data Entered}	{No Data Entered}	{No Data Entered}

V. Planned Program Table of Content

S. No.	PROGRAM NAME
1	Global Food Security and Hunger
2	Sustainable Management of Natural Resources
3	Agricultural Markets, Trade, and Economic/Business Development
4	Food Safety
5	Health and Wellbeing
6	4-H and Youth Development
7	Climate Change
8	Sustainable Energy
9	Childhood Obesity

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
201	Plant Genome, Genetics, and Genetic Mechanisms	8%		8%	
202	Plant Genetic Resources	8%		8%	
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants	6%		6%	
204	Plant Product Quality and Utility (Preharvest)	6%		6%	
205	Plant Management Systems	8%		8%	
211	Insects, Mites, and Other Arthropods Affecting Plants	7%		7%	
212	Pathogens and Nematodes Affecting Plants	7%		7%	
213	Weeds Affecting Plants	6%		6%	
215	Biological Control of Pests Affecting Plants	5%		5%	
216	Integrated Pest Management Systems	6%		6%	
301	Reproductive Performance of Animals	7%		7%	
302	Nutrient Utilization in Animals	8%		8%	
303	Genetic Improvement of Animals	3%		3%	
304	Animal Genome	1%		1%	
305	Animal Physiological Processes	5%		5%	
306	Environmental Stress in Animals	1%		1%	
307	Animal Management Systems	7%		7%	
308	Improved Animal Products (Before Harvest)	1%		1%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2012	Extension		Research	
	1862	1890	1862	1890

Plan	3.0	0.0	6.6	0.0
Actual Paid Professional	0.0	0.0	0.0	0.0
Actual Volunteer	1000.0	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
887369	0	2574264	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
887369	0	2574264	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Adequate vascular development supports embryonic survival and subsequent fetal growth. Vascular endothelial growth factor (VEGF) is the most potent inducer of angiogenesis, and factors regulating VEGF may ultimately affect vascularization. Activation of CXCR4 by CXCL12 increases VEGF synthesis and secretion, which in turn stimulates CXCL12 and CXCR4 production. This synergistic regulation may drive placental vascularization. The objective of this study was to determine if mRNA for CXCL12, CXCR4 and select angiogenic factors and their receptors are differentially expressed in caruncle and fetal extraembryonic membrane tissues on days 20, 25 and 30 of pregnancy, with d10 of the estrous cycle as a control. Real time PCR was used to assess relative mRNA levels. The increase of angiogenic factors in fetal placenta during implantation and placentation highlights the concept that the fetus regulates its vascularization in synergy with the maternal placenta. The relationship between VEGF and CXCL12/CXCR4 underscores the potential role for this chemokine system in placentation. These results provide strong support for enhanced signaling between chemokines and angiogenic factors within the fetal-maternal interface. We interpret these results to mean the CXCL12/CXCR4 pathway is activated during implantation and placentation in sheep and is likely playing a role in the communication between trophoblast cells and the maternal endometrium, specifically driving vascularization. Knowledge gained through this project will provide a more complete understanding of the mechanisms involved in growth and vascularization of the placenta.

This research demonstrated that delaying a bovine viral diarrhea vaccination and initial growth implant for 28 days tended to decrease calf performance during the first 56 days on feed in the feedlot. Therefore, delaying a bovine viral diarrhea vaccination and initial growth implant did not improve efficacy of the vaccination and implant program in stressed calves receiving antibiotic therapy. This research provides insight towards providing nutrition to target improved animal immunity by identifying those amino acids that are limiting in newly weaned beef calves, thereby providing the opportunity to reduce calf morbidity. If this effort reduces calf morbidity by only 2% annually, savings to the United States beef industry is estimated to be \$12 million/year (based on 600 million/year morbidity loss).

Research projects conducted at the Veterinary Entomology Research Laboratory have continued to

center on fly pests of livestock, particularly cattle. Two insecticide resistance studies concerning house flies were completed in 2012, data from which are being used to prepare manuscripts for publication this year in peer-reviewed journals maintained by the Entomological Society of America (ESA). A house fly strain suspected to be resistant to the active ingredients found in neonicotinoid-based fly baits were colonized and evaluated with three of these compounds to determine their resistance levels. To separate any resistance effects due to behavior, such as aversion, these insecticides were applied to house flies using a topical method. The results of this study suggest that resistance to neonicotinoids is at least in part due, to metabolic mechanisms and not due to behavioral aversion. This study was the first to use topical applications of insecticidal active ingredients, which are normally ingested and activated via insect digestion (gut toxins). The results of this study were presented at the annual meeting of the ESA in Knoxville, TN, in November 2012 as, "Evaluating House Fly (Diptera: Muscidae) Insecticide Resistance to Selected Nicotinoids Using Topical Application." A second study to evaluate house fly bait insecticide resistance was conducted both in the field and the laboratory to determine attraction and mortality effects of industry standards, as well as an experimental compound. The results of this study demonstrated that a highly resistant house fly strain exhibited behavioral aversion to certain products, which may also play a role in the loss of efficacy observed for house fly insecticidal baits in the field. Our colonization of the filth fly (house flies, stable flies, and horn flies) biological control organisms, *Spalangia* spp. and *Muscidifurax* spp. have allowed us to recently begin to evaluate the insecticidal tolerance of these insects and whether or not they can acquire resistance to insecticides as their filth fly counterparts do. In addition, we have started studies to determine the attractant host cues used by these organisms, which determine their attack rates; cues that may help us understand and increase their efficacy in the field and in insectaries alike.

Our studies have identified lower gene copy number in glyphosate resistant Palmer amaranth populations from New Mexico compared with populations from Georgia. The difference between the gene-copy numbers of these populations could be due to cropping system related abiotic factors. The primary results of our fitness studies, which will be completed in 2013, also indicate that in pecan orchards the use of competitive vegetations covers will enhance the management of glyphosate resistant Palmer amaranth populations.

We believe that the results from organic farming study will increase our understanding of the ecology of weeds and plant pathogens under various treatments and field conditions. Furthermore, this study will improve our current knowledge of seasonal (short-term) and long-term variability of soil microbial biomass and their co-relation to various pest control treatments in organic agriculture. Effective short- (seasonal) and long-term (seedbank dynamics) weed management strategies that are environmentally and economically sound, and will be evaluated in this study, will enhance the profitability of organic agriculture by reducing the labor and fertilizer cost, at the same time will increase the sustainability of organic systems through soil, water and fertilizer conservations.

The insectary plant mixture has been shown to perform well under New Mexico conditions, producing a continuity of bloom for much of the growing season. The effect of the insectary treatments on the main groups of beneficial insects has been somewhat variable, although parasitic Hymenoptera have shown the most consistently positive response. Nevertheless, in our trials, the plantings had no significant effect on the level of parasitism of squash bug eggs, and factors other than the availability of hosts and floral resources may be limiting the effectiveness of the squash bug egg parasitoids (e.g. the proximity of suitable overwintering sites); studies are now underway to address the latter hypothesis. Insectary plantings are probably most likely to have a demonstrable impact on pests such as aphids that are attacked by a diverse range of natural enemies known to benefit from access to floral resources. Effects on pests such as squash bug, which are chemically defended and attacked by fewer generalist predators, are harder to demonstrate. Nevertheless, insectary plantings are a useful component of overall IPM strategies for small, diversified farms with a range of crops and pests, such as are found in much of New Mexico. A 2012 survey of the state's small-scale growers showed that 65% of respondents have now

adopted this technique.

Research results expanded knowledge in several areas including characterization of emerging pathogens in the Southwest (*Phytophthora capsici*, *Verticillium dahliae*, beet curly top virus, and other), efficacy of engineered disease resistance genes for nematodes, *Phytophthora*, and *Verticillium*. Together, these results expand the knowledge base of significant diseases affecting crops in NM and provide information on efficacy of potential remediation strategies including deployment of natural and engineered resistance genes. In particular, studies on and development of new resistance genes for significant pathogens of chile are expected to lead to practical solutions that will benefit NM producers by reducing losses to these pathogens in the future.

Maturing work in DNA fingerprinting of nematodes is expected to find application in several areas. The improved protocol we have developed is a substantial improvement over past methods that enables reliable DNA fingerprint based ID of single nematodes in 48 hours or less. This method is expected to be useful for nematode ID in areas ranging from ecological studies to product quality assurance and trade regulation.

Our work on the Heteroptera provides information on the biology and ecology of our species that fills gaps in our understanding of these understudied taxa of insects. It also allows for better identification of species of economic importance. Our checklist of the stink bugs provides the first modern look at the distribution of this group, containing many pest and beneficial species, for New Mexico. Our recent work on the morphology of segmentation of the abdomen of *Corimelaena incognita* has broad implications for the morphology and evolution of segmentation in the Heteroptera. Little is known about the blister beetles that are present in the state and the relative importance of the various species as threats to animal health even though hundreds of thousands of dollars are lost with the death and care of livestock injured by these insects. Our work will provide information on the important species to animal health. Our work on the beet leafhopper will impact management timing and strategies for control of this insect and reduction in curly top virus incidence. Efficient management of crop pests can result in a reduction in unnecessary control costs and potentially increase crop yields. This can translate into a significant increase in productivity and profit to New Mexico's growers. Also, fewer insecticide applications can result in reduced exposure of the chemicals to the environment. Our flea beetle data on chile and weed hosts will provide a better picture of the species present and their timing in order to better manage this early season pest.

Urban landscapes and crop production land in arid New Mexico are dependent on irrigation water supplied by compacted earthen canals and laterals either continuously or intermittently throughout the nine month irrigation season. *Equisetum hyemale* has been an increasing problem on the canals, using water intended for irrigation and obstructing water flow in irrigation canals. The research will result in new management tools for suppressing *Equisetum* populations on canals. However, in recent drought years, *Equisetum* populations have been suppressed by feather fingergrass on many canal banks; these populations have been managed by spraying with low rates of glyphosate. Preliminary data suggests that New Mexico populations of feather fingergrass vary in their response to glyphosate leading to concerns that these populations are evolving resistance to this herbicide. Growers and others rely heavily on glyphosate for their weed management. Identification of weeds that are not controlled by this herbicide will reduce ineffective use of this product and will also reduce the selection pressure that results in either selection for weed species that are not controlled by glyphosate or to species that have evolved resistance to glyphosate. The research on effectiveness of herbicides used in chile pepper will result in better recommendations to growers who are interested in using these products for weed management in this non-competitive crop. Without effective weed management tools, advances in mechanical harvesting will not be realized because weeds will continue to hinder the ability of the harvesters to remove the chile fruit in the field. The work to develop modeling approaches for predicting the presence or counts of root-knot nematodes based on nutsedge counts will result in additional tools for growers to identify problem areas in their fields before the pest complex becomes dominant. Finally, clear and correct identification of the

nutsedge species complex present in New Mexico fields is critical to defining the weed problems faced by growers.

Our research on curly top virus focuses on the ecology, epidemiology and management of the disease caused by the virus in chile. We looked at curtoviruses in mixed infections and the effects of host plants on those interactions. We took the first steps to characterize the leafhopper/virus interactions, including studying the bacterial endosymbionts of the leafhoppers. Understanding more about the ecology, genetics, transmission, and weed hosts of beet curly top virus in New Mexico will aid in developing management options for chile growers. Our predictive model for curly top in southern New Mexico has given growers information on the disease so that they can make informed choices on which management methods they will need to use to handle the disease pressure. The information on virus-tolerant plants provides growers with several pepper types that can be grown without significant disease losses.

Our research on fungal endophytes of locoweed has made progress toward characterization of endophytes from locoweeds throughout the western US. We concluded studies characterizing the proteome profiles of several of the fungal endophyte species. We also concluded work on the localization of the endophyte in *Oxytropis* plants using different types of microscopy. A better understanding of the role that the fungal endophytes of locoweed play in locoism, the genetics of the fungi, and the factors that influence toxin production will lead to new options to mitigate the disease locoism and its impact. The information generated thus far changed knowledge significantly, in that nothing has been known about the mechanism by which the fungi produce the toxin. In addition, we now understand much more about the ecology and biology of the fungi.

The ET internet site is nearly complete. Farmers will be able to access this site and track irrigation water use. They will be able to follow the water use for their crop and determine when to irrigate next. This internet site will help the farmer to use the right amount of water at the right time. As farmers properly manage water applications other input costs will be minimized.

Developing a simple spreadsheet tool that will evaluate irrigation pump performance, will help irrigation farmers track energy use and efficiency and help identify any problems that are developing. This tool will identify a problem before thousands of dollars are lost to inefficient pumping.

Developing a low cost, easy to construct water control gate will help irrigation districts and farmers manage water more efficiently. This device will be safer than stop-log structures and individual irrigation districts or farmers will be able to construct this gate with common fabrication tools that they have available.

Canal control algorithms will help irrigation districts determine how much water to divert down canals to meet the water demands of individual farms. Water use will be matched to the needs of the water users with little or no waste.

Declining well outputs and restrictions from ground water districts are compelling area farmers to conserve water. Low water using alternate crops are getting attention of the farmers. During field days, a number of farmers have expressed their interest in the alternate crops I am working with. A few have visited my trials and discussed with me about my findings. An area farmer, who grew safflower in an extremely dry year, is encouraged by the yield levels and wants to try it again. Development of winter safflower will be promising for the area producers. More research is needed to evaluate integrated cropping systems, alternate crops, stubble and tillage management, reducing crop damages by wind (sand blasting), and innovative water management practices.

We have demonstrated that HUAPs are an effective way of predicting growth stages of chile and can be a useful model for growers, especially when applying PGRs. Field managers from Mizkan Americas,

Inc. (formerly Border Foods) have adopted and currently track heat units as a prediction and management tool for their chile growers. We continue to use it in ongoing research projects requiring PGR applications.

Recommendations for rotational/cover crop species with specific roles, characteristics, and modes of use are in development. In this way, growers will have access to information regarding weed and pathogen suppression, and crop growth enhancement characteristics of each rotational, bioactive (biofumigant) crop. This can help to minimize the costs and reduce the environmental harm of traditional chemical fumigants.

The forage industry plays a vital role in New Mexico's agricultural economy. The magnitude of the role of forages in New Mexico and throughout the United States has been changing over the past few decades and changes are likely to continue in view of heightened awareness of the need for better environmental stewardship and food security, the demands of a growing livestock industry, and the need to develop alternative energy sources. Based on published research reported in this performance evaluation, if 5% of New Mexico's alfalfa growers select the highest yielding alfalfa variety over the lowest yielding variety within a region, the return would be at least \$2.5M annually, which is consistent to 2011, and almost twice that of previous years. For producers growing sorghum forages in rainfed conditions, photoperiod sensitive cultivars will yield 1.5x that of forage sorghum and sorghum forages planted in May or early June will have approximately twice the yield of sorghum forages planted in late June or July depending on late season precipitation. Taller growing perennial warm-season grasses that are native to New Mexico have similar biofuel quality characteristics to switchgrass when harvested post-frost.

Open-pollinated, male-sterile, maintainer, and pollinator breeding lines were screened for disease resistance, bulb yield, bulb quality, maturity date, and bulb color. Promising breeding and hybrid lines and released cultivars were compared to commercial cultivars and experimental lines using variety trials. The New Mexico onion industry is economically significant and is highly competitive. The industry has a recent history of expansion, and the potential exists for further expansion. Further development and release of high-yielding, high-quality, well-adapted, bolting-resistant, disease-resistant, short-, intermediate-, and long-day onion open-pollinated and hybrid cultivars with varying maturities and scale colors, and improved bulb quality will support industry growth in New Mexico. Genetic improvement in bolting resistance, disease resistance, and bulb quality also will facilitate further expansion and add significantly to New Mexico's economic development. Identification of verifiable sources of Iris yellow spot virus tolerance and/or resistance would lead to the development of tolerant/resistant cultivars and reduced disease impact on onion yield throughout the western United States.

With the strawberry research and jujube research conducted at the NMSU Alcalde Center, plus presentations at the ASHS meeting, New Mexico Organic Farming Conference, and workshops, numerous home gardeners planted jujubes in their yards and several commercial growers started to plant jujubes and strawberries on their farms.

There is great interest in high tunnels for production of horticultural crops. By enhancing the ability of local growers to have product more of the year, they may be able to pursue additional markets, including school lunches and year-round farmers' markets. The hoop house projects at Alcalde and Las Cruces, NM, have been the subject of numerous tours to visitors, scientists, school groups, and legislators.

Commercial seed production of the drought tolerant alfalfa cultivar, NuMex Bill Melton, is underway. This will ensure that farmers in the southwestern U.S. can benefit from its yield stability in both well-watered and water-limited environments. In previous research, this project identified specific alfalfa chromosome regions (i.e., QTL) that influenced shoot and root biomass production during drought stress. We recently used DNA marker assisted selection (MAS) techniques to transfer some of these QTL into elite cultivar backgrounds. One DNA MAS study suggested that the ERECTA gene may play a key role in affecting alfalfa forage productivity and water-use efficiency in drought-prone environments. In a separate field study, evaluation of multiple MAS-derived populations over two years indicated that some QTL

improved alfalfa cultivar productivity by 6% to 19% under well-watered and drought-stressed conditions. The high performance of some germplasm developed through this project suggests that it may be suitable for commercial release, pending additional testing in multiple environments. Given that annual increases of 1% are the norm for yield improvement in many crops, but much less so in alfalfa, the potential of MAS to improve alfalfa forage productivity and drought resilience appears to be very promising. Water is a critical agricultural resource and effective use and reuse requires an understanding of crop requirements, climate and soil/medium characteristics. Novel irrigation scheduling protocols were developed for container-grown conifer seedlings which will improve irrigation efficiency and decrease greenhouse runoff. Long-term treatment of wastewater via a land application system has been evaluated. Both the vegetation and soil response were monitored and prescriptions for the slow-rate land application of wastewater to desert ecosystems developed. This is the first time this system has been documented in an arid environment. Prescriptions for improved seedling survival and growth were developed for *Pinus ponderosa* forestation programs in Argentina. Prescriptions for managing irrigation scheduling of containerized conifer seedlings for reforestation were developed. Land application of partially treated wastewater can reduce contamination of surface waterways, while providing alternative crops for small landowners. Impact of 5 years of saline wastewater application to desert soils was determined.

The greenhouse and nursery industry is in need of alternative potting media components to circumvent the increasing costs of traditional peat moss and pine bark. Pecan wood prunings are readily available in southwestern U.S. pecan orchards. A study is in progress to investigate the potential for chipped pecan wood to substitute for peat moss and pine bark in potting substrates at two commercial greenhouse and nursery firms. Preliminary results indicate that as little as 25% volumetric substitution of peat moss and pine bark by various particle sizes of wood chips reduces the growth of three potted ornamental plant species. The negative effect of pecan wood chips on the growth of several potted ornamental crops indicates that there is a need to modify cultural practices to allow partial replacement of peat moss or pine bark by pecan wood chips in commercial greenhouse and nursery potting media.

The New Mexico Recombinant Inbred Lines (NMRILs) were used to characterize the physiological races of *Phytophthora capsici* isolates from Brazil. *Phytophthora* blight, caused by *Phytophthora capsici*, is one of the most destructive diseases in New Mexico and worldwide that affects *Capsicum* pepper. In addition, the screening method used at Embrapa Vegetables in Brazil to detect resistance to *P. capsici* in *Capsicum* was compared with the screening method used at New Mexico State University. Both screening methods produced similar and consistent results when a range of *P. capsici* isolates were used. It was concluded that either method can successfully differentiate resistant and susceptible individuals. When 20 *P. capsici* isolates from Brazil were characterized for virulence using a subset of 26 New Mexico Recombinant Inbred Lines (NMRILs) of *Capsicum annuum*. Within the *P. capsici* populations from Brazil, eight new physiological races for the root rot disease syndrome were identified. A total of nine isolates were pathogenic only on the susceptible control 'Camelot.' The ability to identify physiological races of *P. capsici* occurring in Brazil allows for a better understanding about race-specific resistance leading to improved approaches in breeding for durable resistant cultivars. This information is very important in chile pepper breeding programs for developing resistant cultivars, and will aid New Mexico in being vigilant for the possibility of new races being introduced from South America.

Extension

A tremendous emphasis has been placed on emergency management preparedness programs through the dedicated work of trained Extension agents and specialists this past year. These global food security efforts have emerged from a growing and strong resource commitment of the New Mexico Cooperative Extension Service over the past five to eight years. Agents and specialists have focused their work on seven areas: county emergency management planning; insect diagnostic detection; pesticide applicator trainings; master gardener first detector programs; youth entomology projects; livestock ALIRT programs; and collaborations with various local and regional agencies.

County emergency management planning programs largely fall on the agendas of county agents working with local producers and county emergency personnel developing agro-terrorism emergency disaster and food related emergency plans. They continue to work with government officials, medical personnel, and local elected officials to incorporate emergency disaster planning into daily government routines. Agents provide trainings and three planning phases to help build buy-in with local citizenry. Phase one is the introduction to why disaster planning is an economical sound decision. Phase two is the trial and error phase where plans evolve and commitment tends to grow. Phase three brings permanency to the plan(s) and is initiated while adjusting the issues resulting from phase two trial and error. As a result of counties initiating emergency disaster plans, they report being able to apply for funding to complete their customized and localized plans. Last year, the extensive occurrence of several New Mexico wild fires and the need to put plans into action brought the need for disaster planning home rather dramatically. In preparing for food related incidences, agents provided animal, plant and food incidents training to county officials. This six hour FEMA training provided area producers, restaurant owners, public and private food service entities, fire department volunteers, local police, and dispatch personnel with invaluable training as reported in post-session evaluations. Participants generally reported a 98% knowledge increase.

Agents spearheaded work with the local livestock producer organization and county emergency manager to form a County Agriculture Emergency Planning Committee. The need to develop this plan usually stems from the fact that the agriculture industry in the county is a major contributor to the economy of the county; accounting for at least a third of the annual total gross receipt taxes. The negative impact of an outbreak of disease, or impact of a natural or man-made incident (severe weather, wildfire, flood, a Hazmat incident), could result in economic losses on an enormous scale. The agents meet with producers and the planning committee at least four times throughout the year. The 'plan', which usually takes about a year to develop, is thoroughly edited. The plan includes a list for the Emergency Managers and County Commissioners who are identified as primary and secondary producer contacts across the county. These folks have agreed to serve as geographically located information sources if an emergency occurs in their area of the county. A phone tree is developed as well as a county map of roads and off roads, gates, and obstacles along with a county resource map of equipment availability in different areas of the county. This is a living document that will need to be updated annually. The agent also facilitated a meeting between the area producers and commissioners to address major concerns about county roadwork and assistance during times of emergency to both residents and livestock. In this example forty-eight producers and thirteen county government professionals participated.

Insect diagnostic detection is another aspect of NM CES global food security programming. This area of work is led by Extension specialists and is largely driven by county offices receiving requests for information on particular pest destruction. This information is extensively catalogued and tracked which in turn generates reports for the NM Department of Agriculture and USDA, providing state records when identifications are confirmed. How many damage reports are logged each year depends on how many people need to learn what pests they have and what to do about them quickly. Popular press books, particularly of insects, are often inadequate for 'do-it-yourself' people who are unclear about what 'organic controls' are or how to apply them successfully. Requests to assist clientele depend on many factors. NM CES agents and specialists have found they all have roles to play in making themselves available, being approachable, having a willingness to assist, delivering requested information in a timely fashion, and having a reputation for accuracy. Pesticide applicator trainings last year numbered over 30 presentations statewide including county emergency management planning; insect diagnostic detection; pesticide applicator trainings; master gardener first detector programs; youth entomology projects; livestock alert programs; and collaborations with various local and regional agencies. Of the 1853 individuals attending these presentations, 114 were trainees with the remainder already licensed; of the ornamentals and turf trainees, all indicated an appreciation for highlighting and emphasizing the study tips posted by NM Department of Agriculture (a training partner). A hybrid program emphasizing the principles of Integrated Pest Management (from the NMDA study guide), basic entomology and a series of examples from the

Category 1A (Agriculture Plant) manual was created for trainees who needed their private applicator licenses. Over 680 of the licensees attended workshops geared for 'Ornamentals and Turf--- a mixture of public and commercial licensees in Category 3A. Roughly 1051 attended workshops with more varied pest and host subject matter as would be expected for farmers or ranchers, who are primarily Private Applicators. Currently, Private Applicators need to verify completion of 5 Continuing Education Units (CEUs) in 5 years to be eligible for license renewal. There's no way to tell if this group of attendees needed all 5 (or fewer) CEUs before the end of the year or if they were taking a particular workshop because of subject matter provided or just convenience. In an effort to address the variety of audiences, updates were made on the 'entomology roundup' presentations for licensees, adding or deleting information depending on the general interests of the audience, that included ornamental and turf farmers, fruit or field crop farmers, vegetation managers (requiring bio-controls for certain weeds and Integrated Pest Management) and ranchers (who must guard against grasshoppers and assorted other arthropods that attack range plants, people, pets and livestock).

Assuming Category 3A trainees receive, on average, a salary of \$25,000 annually and licensees receive \$32,000 annually, and allowing for seniority as well as experience; these two groups could be responsible for \$24.5M in New Mexico's food service economy. Incomes from farms and ranches in New Mexico vary widely for many reasons, but assuming an average of \$60,000 profit for each Private Applicator licensee, this group could be responsible for over \$63,000,000 in the state's agricultural production economy.

Licensing does not require an individual to purchase and use restricted pesticides; the license gives individuals the flexibility to do so. Licensees are exposed to a variety of pertinent topics during recertification workshops (not sales pitches). They are made aware of their potential linkages to Cooperative Extension Service personnel at county and state offices, and they have the opportunities to meet these personnel and discuss particular problems.

Unlicensed applicators more than likely will not make the effort nor pay the expense to attend workshops if they were not required to keep their applicator license. Trade magazines do not provide the same quality information, the level of detail, or potential follow-up with presenters as delivered at Extension workshops. Organic producers, by law, must consider all pesticides as 'restricted', but organic producers are not required to have Pesticide Applicator licenses in New Mexico. Attendance at the annual organic farmers' conference is optional. Judging from questions asked on phone or in-office contacts, or when identifications are made, some have very limited experience with crop or livestock production and even poorer understanding of which pesticides are acceptable, which are not, and why (for organic production in New Mexico).

Master Gardeners (MGs) are committed to learning the basics on a variety of topics. Some MGs are designated as first detectors when it comes to entomology. Unfortunately, in entomology, the basics often seem alien to many. Even the common examples of insect pests and beneficials are numerous. Since entomology classes may last only 3 hours (on average), the tour of common insects through programs on vegetables, fruits and nuts, beneficials, ornamentals and turf can be intense. Emphasis is given to vegetable/fruit and nut pests since turf isn't as popular, due to drought. Beneficials and tree pests are the most popular entomology topics for NM Master Gardeners. Comments on evaluations are qualitatively helpful in judging the connection with the audience and their experience with the plants and pests under consideration.

Twelve entomology MG programs were conducted in nine counties last year, including one 'First Detector' and two 'general garden/theme' presentations for special events. All presentations are made with specimen displays and, while some of these specimens are truly exotic, they do represent the variety of arthropods found in the world and easily show audiences some of the features mentioned in lectures. At the annual MG conference, some trainees had the opportunity to collect arthropods from an ornamental

garden and see these living specimens through a dissecting scope. This added a new level of understanding and arthropod appreciation.

Youth entomology projects and programs are carried out in NM 4-H. There is an extensive collection of study materials for 4-H projects and competitions, which are held annually. They include identification quizzes, and a 50 multiple choice and 50 true/false question exam on pesticide use and safety. Display specimens are used for judging as well as for educational programs in schools. Last year 1017 participants were involved in some facet of entomology projects and programs. Sixteen adults, leading various 4-H clubs from around the state, were advised of entomology project learning materials and given copies to use with youth.

Collaborations with various local and regional agencies and focuses on the efficient use of public resources continue to prove beneficial for citizens. Collaborative partners and other agencies that benefited from work completed last year included US Department of Agriculture (APHIS and ARS), US Forest Service, Bureau of Land Management, NRCS, NM State Forestry, Texas State Forestry, Texas AgriLife Extension Service, NMSU 4-H, NMSU FFA, county and city parks and recreation departments, school districts, pest control businesses and applicators, farmers, ranchers, gardeners, and homeowners. Programs were also created and delivered for Southwest Turfgrass Association, Texas Pest Control Association, Think Trees, NM Vegetation Management Association, Pecan Growers Workshop and Conference, Chile Conference, Onion Field Day, NM Master Gardeners' State Conference, Roswell Independent School District (Retired Teachers' Organization for Super Day for Super Students), NM State Parks (Bosque State Park), Bosque Farms Elementary School, NMSU Entomology, Plant Pathology and Weed Science (Diagnosing Plant Disorders class) and Mercer School.

The diversity of NM CES global food security programs across the state include program presentations and organizational efforts with

- FEMA Foreign Animal Disease Exercise and Joint exercise with the FBI on Agricultural Emergency Preparedness;
- Meetings with USDA National surveillance Unit about Syndromic Surveillance and transitioning into the Enhanced Passive Surveillance Program;
- NM Syndromic Surveillance and ALIRT (Arizona Livestock Incident Response Team) programs; NM-ALIRT Conference; and
- NM-ALIRT and Syndromic Surveillance - FBI International Symposium on Agro-terrorism.

The NM-ALIRT and Syndromic Surveillance program (modeled after a similar program in Arizona) was developed in NM. This is a state-wide network of practicing veterinarians who have been equipped and trained to respond to large or suspicious livestock losses that occur in New Mexico. This program is designed to provide a first line of defense against disease or terrorism incidents that may threaten the livestock industry of New Mexico. Participating veterinarians also report monthly on disease syndromes that will allow for earlier detection of disease trends or outbreaks. As this program evolves, it is expanding into a more regional approach to emergency preparedness which now includes veterinary practitioners in Arizona and Texas in the reporting process and the addition of a web-based reporting surveillance component. This program is being evaluated by the USDA National Surveillance Unit for expansion into a national livestock health surveillance system and has been presented at several national meetings as a model for other states to follow. This program now includes classes on Agri-bioterrorism, taught at NM State University to FBI agents from all over the United States.

2. Brief description of the target audience

The target audience includes: ranchers, feedlot operators, dairy producers, small/medium/large-scale agricultural operations, business, associations, cooperatives, consulting firms and collectives that might or might not be defined as a farm under the USDA economic return criteria, but are land owners, managers,

consultants, or students who wish to improve agricultural production and efficiency. Other audience participants include Extension agents, other agricultural specialists, pesticide applicators, Master Gardeners and garden clubs, youth (4H, Future Farmers of America and other groups) and the general public.

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2012	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	0	0	0	0

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

Patent Applications Submitted

Year: 2012
 Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2012	Extension	Research	Total
Actual	5	5	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- The specific output measures will vary according to the specific project being monitored. The development of research procedures and technology, training of students, publishing research papers, and disseminating research results via educational workshops, conferences, and Extension media are important outputs for the various projects falling under this planned program.

Year **Actual**
 2012 0

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	# of trained professionals
2	# of improved animal varieties
3	# of research publications
4	# of methods, technology, and animal varieties adopted by public and private sectors
5	# Extension publicatons

Outcome #1

1. Outcome Measures

of trained professionals

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

{No Data Entered}

What has been done

{No Data Entered}

Results

{No Data Entered}

4. Associated Knowledge Areas

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

301	Reproductive Performance of Animals
302	Nutrient Utilization in Animals
303	Genetic Improvement of Animals
304	Animal Genome
305	Animal Physiological Processes
306	Environmental Stress in Animals
307	Animal Management Systems

Outcome #2

1. Outcome Measures

of improved animal varieties

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
{No Data Entered}

What has been done
{No Data Entered}

Results
{No Data Entered}

4. Associated Knowledge Areas

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

Outcome #3

1. Outcome Measures

of research publications

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	134

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

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

- 305 Animal Physiological Processes
- 306 Environmental Stress in Animals
- 307 Animal Management Systems

Outcome #4

1. Outcome Measures

of methods, technology, and animal varieties adopted by public and private sectors

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

{No Data Entered}

What has been done

{No Data Entered}

Results

{No Data Entered}

4. Associated Knowledge Areas

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

- 301 Reproductive Performance of Animals
- 302 Nutrient Utilization in Animals
- 305 Animal Physiological Processes
- 306 Environmental Stress in Animals
- 307 Animal Management Systems
- 308 Improved Animal Products (Before Harvest)

Outcome #5

1. Outcome Measures

Extension publications

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	16

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Producers and homeowners require current information regarding growing, rearing, or protecting plants and animals.

What has been done

Extension publications have provided information to producers and consumers.

Results

Producers and consumers have access to current recommendations regarding growing/rearing plants or animals.

4. Associated Knowledge Areas

KA Code	Knowledge Area
204	Plant Product Quality and Utility (Preharvest)
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Pathogens and Nematodes Affecting Plants

213	Weeds Affecting Plants
215	Biological Control of Pests Affecting Plants
216	Integrated Pest Management Systems
307	Animal Management Systems

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

New Mexico continues in severe drought, which affects agronomic, animal and range research.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

The majority of adult program evaluations carried out by New Mexico Extension agents and specialists are pre-post and post-program knowledge gain instruments. The majority of youth (primarily 4-H club) program evaluations are demonstrations of knowledge gained and applied in teaching others, competitive events, and climbing 'youth career ladders'. Rarely, if at any time, does an agent or specialist report that participant knowledge attained/gained was less than satisfactory. One can only assume that knowledge gain survey questions are fairly worded, and that audience participation was not mandatory. The only exception to this is with Master Gardener and Integrated Pest Management qualification exams. But again, participation is initially by application and the desire to learn and apply what is learned.

Key Items of Evaluation

What is interesting to note is that most Extension faculty now use goal setting, program objectives, and evaluation instruments in their program plans (as opposed to 10 years ago, when there was a great degree of resistance). The next step in program evaluation is to assist Extension agents and specialists to develop precision evaluation instruments. On-going training, such as the Western Extension Cohort (Evaluation) Training (WECT), needs to be organizationally supported and participation needs to be encouraged by all Extension faculty.

Also, the American Evaluation Association has an Extension group section and should become a legitimate and heavily encouraged professional Extension association. The Association does more than any other organization to encourage evaluation 'best practices.'

V(A). Planned Program (Summary)

Program # 2

1. Name of the Planned Program

Sustainable Management of Natural Resources

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%		15%	
103	Management of Saline and Sodic Soils and Salinity	5%		5%	
121	Management of Range Resources	30%		30%	
123	Management and Sustainability of Forest Resources	10%		10%	
135	Aquatic and Terrestrial Wildlife	10%		10%	
136	Conservation of Biological Diversity	5%		5%	
405	Drainage and Irrigation Systems and Facilities	10%		10%	
605	Natural Resource and Environmental Economics	15%		15%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2012	Extension		Research	
	1862	1890	1862	1890
Plan	7.3	0.0	14.3	0.0
Actual Paid Professional	5.0	0.0	16.8	0.0
Actual Volunteer	0.0	0.0	0.0	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
441161	0	1520332	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
441161	0	1520332	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Water claims in New Mexico's RioGrande Basin exceed reliable supplies by a factor of at least ten to one. In this basin, demands for irrigation, urban use, the environment, and energy continue to grow, while supplies remain constrained by unsustainable use, drought and impacts of climate change. Policymakers in this basin face the challenge of designing plans for allocating the basin's water supplies efficiently and fairly to support current uses and current environments. Managers also seek resilient institutions that can ensure adequate supplies for future generations. This project addresses those challenges by designing and applying an integrated basin scale framework that accounts for the basin's most important hydrologic, economic, and institutional constraints. Its unique contribution is a quantitative analysis of three policies for addressing long term goals for the basin's reservoirs and aquifers: (1) no sustainability for water stocks, (2) sustaining water stocks, and (3) renewing water stocks. It identifies water use and allocation trajectories that result from each of these three plans. Findings show that it is hydrologically and institutionally feasible to manage the basin's water supplies sustainably. The economic cost of protecting the sustainability of the basin's water stocks can be achieved at 6-11 percent of the basin's average annual total economic value of water over a 20 year time horizon. Our plan is to use the knowledge gained in developing these frameworks to gain insights into cost effective water and agricultural conservation policies in New Mexico and other water stressed regions of the world such as Iraq, Israel, Afghanistan, Ethiopia. We are also looking for lessons from this work that enables New Mexico water leaders to be better informed for the design of more resilient water institutions for the RioGrande Basin in the face of potential drought and climate change.

Social, economic, and environmental systems can be vulnerable to disruptions in water supplies that are likely to accompany future climate changes. We provided policy makers with assessment of economic methods and measures of climate change damages on U.S. water resources.

A promising look at bi-national co-adaptation was highlighted to illustrate the potential for building regional adaptive capacity. Climate change and growing populations are dual stresses that are particularly challenging to communities along the US/Mexican border where adaptive capacity is limited, infrastructure lacking, and economic resources are scarce. We provided highlights on the climatic changes that are projected, identified key systems and sectors that are vulnerable to climate change, described and summarized the role of adaptation and the development of adaptation strategies.

Assessment of local-scale adaptation and long-run capacity building in acequia communities in Northern New Mexico was provided and is intended to encourage consideration of possible responses of vulnerable communities to current stresses from population growth, changing community composition, and projections of water scarcity that are expected to accompany long-run climatic changes.

The fire models BehavePlus and FlamMap were used to evaluate how reductions in herbaceous fuels and fuel bed depth would be expected to alter fire intensity and behavior, assuming a 60.7 ha TG area. Targeted cattle grazing was able to alter fire behavior most effectively when both fine fuels and stubble height were reduced to levels observed in the Arizona study. Grazing treatments were more effective in grass dominated areas compared to grass/shrub sites, which may require additional or alternative fuel treatments. Fire models projected that flame lengths with moderate fuel moisture conditions would be reduced by over 1.2 m with TG. On grass dominated sites rate of fire spread was reduced by about half except with extremely dry conditions. Cattle grazing treatments shortened the distance traveled by simulated fire by about 1.6 km. Costs of using TG treatments will vary widely depending on the situation of implementation. Grazing treatments along an urban/wild-land urban interface area would likely be more costly but potentially provide large payoffs in reduced fire hazard and fire intensity. Targeted grazing treatments conducted in Arizona and New Mexico were used as the basis for estimating the time, effort and costs required to implement TG treatments along the urban interface and on existing grazing allotments. Cost estimates of using targeted cattle grazing as a fuel reduction method ranged from about \$25/ha to \$250/ha depending on the grazing scenario, assumed labor cost, and desired level of reduction in herbaceous fine fuels. Targeted cattle grazing may be most advantageous when relatively small reductions in fine fuels are desired. If fine fuel reductions of over about 700 kg/ha are desired, holding animals with temporary electric fence would be more cost effective than using low-stress herding and supplement. Targeted cattle grazing can be a feasible alternative to reduce fine fuels in some scenarios because costs are similar to alternative treatments to control fine fuels such as mowing and prescribed fire. The targeted grazing studies will refine and further evaluate the use of low-stress herding and strategic supplement placement as tools to focus cattle grazing without fencing to accomplish specific land management objectives. This research is examining the potential to use cattle for developing fire breaks in forested rangeland. Preliminary results suggest that some cattle ranchers could develop fire breaks in rugged terrain to assist firefighters at a cost similar to other alternatives, such as mowing, that only be applied in gentle terrain. Such a practice could potentially reduce the risk of damage to private property, reduce costs of wild-land firefighting efforts, and provide additional income to cattle ranchers. This practice also has the potential to allow cattle grazing in extensive pastures where part of the area has been burned. Targeting cattle grazing away from burned areas would allow vegetation to recover while allowing livestock use in unburned areas. Part of our research will contribute much-needed understanding of factors that determine whether and when ranchers and other land managers are likely to implement this type of innovative management practice.

Vegetation surveys in the 4 study pastures for herbage production and plant cover were completed in October of 2012. All 4 pastures were stocked with cattle in March 2006. Cattle weights and calf crop information have been collected every year from 2006 through 2012. Results show higher cow and calf weights in lightly stocked pastures than conservatively stocked pastures. Forage production has been higher in lightly than conservatively stocked pastures in most years. Grazing use has averaged 28% in lightly stocked pastures and 39% in conservatively stocked pastures. A model has been developed and published relating long term forage production to precipitation on the steady pastures. This research has the potential to reduce the adverse impacts of livestock grazing on rangeland soils, vegetation and wildlife. Light stocking leaves more residual vegetation for protection of soils, watershed, and wildlife habitat. Light grazing appears to allow forage plants to maximize their productivity and it may be more beneficial than grazing exclusion. Light grazing lowers rancher risks and may increase monetary returns over conservative grazing based on preliminary results. This research has the potential to reduce rancher/environmentalist conflicts by providing better technology to maintain and improve vegetation and wildlife habitat. Increased rancher income could reduce rangeland losses to subdivisions and other development. In previous research from this project, we found conservative grazing was advantageous over moderate grazing in terms of maintaining forage production, drought, reducing rancher risk and providing higher net profits.

Urban landscapes and crop production land in arid New Mexico are dependent on irrigation water supplied by compacted earthen canals and laterals either continuously or intermittently throughout the nine month irrigation season. *Equisetum hyemale* has been an increasing problem on the canals, using water intended for irrigation and obstructing water flow in irrigation canals. The research will result in new management tools for suppressing *Equisetum* populations on canals. However, in recent drought years, *Equisetum* populations have been suppressed by feather finger-grass on many canal banks; these populations have been managed by spraying with low rates of glyphosate. Preliminary data suggests that New Mexico populations of feather finger-grass vary in their response to glyphosate leading to concerns that these populations are evolving resistance to this herbicide. Growers and others rely heavily on glyphosate for their weed management. Identification of weeds that are not controlled by this herbicide will reduce ineffective use of this product and will also reduce the selection pressure that results in either selection for weed species that are not controlled by glyphosate or to species that have evolved resistance to glyphosate. The research on effectiveness of herbicides used in chile pepper will result in better recommendations to growers who are interested in using these products for weed management in this non-competitive crop. Without effective weed management tools, advances in mechanical harvesting will not be realized because weeds will continue to hinder the ability of the harvesters to remove the chile fruit in the field. The work to develop modeling approaches for predicting the presence or counts of root-knot nematodes based on nutsedge counts will result in additional tools for growers to identify problem areas in their fields before the pest complex becomes dominant. Finally, clear and correct identification of the nutsedge species complex present in New Mexico fields is critical to defining the weed problems faced by growers.

As a result of resource manipulation and other ecological research, Agricultural Experiment Station scientist will be better able to sustainably manage our native vertebrate fauna and desert and plains grasslands. The projects will result in recommendations for grazing management that will incorporate measures of native biological diversity and ecological factors that influence diversity. Results from our research on burrowing owl ecology will directly affect the management of the USDA Forest Service Great Plains National Grasslands. Data collected for this project can also help alleviate future entanglements related to the management needs and status of specific species, and will contribute to enhanced wildlife viewing.

Agricultural Experiment Station research is pertinent to the conservation and sustainable use of natural resources. Our large carnivore research will provide valuable information that state game agencies can use to manage their populations. Our work on examining the movements of golden eagles across North America will provide federal and state resource agencies with information necessary to plan renewable energy projects.

In New Mexico, the brown trout is an invasive species in mountain streams that creates problems for the local native cutthroat trout. AES scientists collaborated with European colleagues to learn about factors influencing the hatching success of brown trout so that insights might be gained into the local situation. Results from fish and crustacean projects benefit water management in arid landscapes and help managers foresee possible effects of human interventions on the ecology of aquatic systems. Impacts of the project include a presentation on invasive aquatic species to a local high school audience and a lecture to a university water-issues class on irrigation management strategies to facilitate conservation of native fishes a university class. Broader impacts are associated with publication of research results in international peer-reviewed journals.

Soil salinity and sodium affected soils negatively effects crop production which costs farmers both yield and profit. Additionally, the management of saline and sodic soils requires additional water resources that are in short supply. Soil test results have identified areas of concern within New Mexico where crop production may well be affected without addressing the cause of the problem or changing management practices. While salinity can be managed with leaching irrigations it also leads to nitrate-N leaching below the root zone of the crop and could potentially reach groundwater resources. Funded studies

demonstrated that the use of nitrification inhibitors, on the whole, do not help yield and do not help prevent nitrate-N losses. Rates and timing of N fertilizers offers the most promise in controlling salinity and nitrate movement through the soil profile.

AES researchers evaluated the performance of residential weather-based irrigation controllers that were used to irrigate tall fescue plots (*Festuca arundinacea*) installed in the arid southern Chihuahuan desert. In one experiment, Irritrol Smart Dial, RainBird ET Manager, Aqua Conserve, Hunter ET System, Weathermatic SL1600, and one manual irrigation controller programmed at 80% of historical reference evapotranspiration were tested. Compared to the manual controller, Irritrol and RainBird treatments saved 53% and 34% of irrigation water, respectively. In another experiment, Irritrol Smart Dial and RainBird ET Manager were tested for one year. Although soil moisture content of Irritrol-irrigated turf plots dipped below 50% of available soil water capacity from November 2010 to January 2011, leaf relative water content of turfgrass in both treatments exceeded 85%. The Irritrol controller applied less water than the RainBird, but the ratio of variable to maximal fluorescence averaged 0.78 for both treatments, indicating that the turfgrass was not stressed. This research clearly shows that one weather-based irrigation controller can apply significantly less water than another while maintaining similar quality of turfgrass grown in southern New Mexico. Therefore, weather-based controllers destined for this region must be field tested. For example, 4,269 square feet of cool-season grass in Las Cruces, New Mexico would receive 192,569 and 313,795 gallons per year when irrigated with the Smart Dial and RainBird ET Manager, respectively. However, the quality of the grass would be similar.

Scientists have just completed a prototype internet site that can be used by a farmer to estimate the ET for his crop. The internet site can estimate ET for any of the lower 48 US states and parts of Canada. All that is required from the farmer is crop type, acreage, planting date, and last irrigation date. Testing has been ongoing. Several problems have been identified and corrected. Additional refinement of the internet site is continuing. A spreadsheet program has been developed that will help farmers evaluate and track irrigation pump performance. This program requires that the farmer enter pump operating pressure, pump drawdown, and flow rate to estimate energy costs. These estimated costs can be compared to actual costs so that the farmer can track pump performance and determine if the pumping system is operating properly. If it is determined that the pump has significantly departed from expected performance, measures can be taken to correct the departure. The program is undergoing continued testing to determine if there are any problems that need correction. A simplified canal control gate design has been determined and drawings are being completed for this gate. Two irrigation districts have been selected to construct these gates to try to determine if the drawings and instructions are adequate. An open channel simulation algorithm has been completed to operate in Matlab. The algorithm solves the St. Venant open channel flow equations using a 4 point implicit solving method. This algorithm has been used to test a simplified gate control routines that can be used on numerous canals in the Western United States.

Work on the response of chile pepper and cotton plants to salinity has helped identify some varieties that are more sensitive or tolerant to salts during germination and emergence stages. Selection of salt-tolerant chile pepper varieties will improve local economies by reducing water requirements for irrigation and improve agricultural yields of chile and cotton, both important New Mexico commodities. Research on soil quality continues to impact local and regional agricultural practices and potential remediation of contaminated soils. The work on salinity and contaminants such as arsenic should impact land application practices at wastewater facilities.

Research at the Farmington Agricultural Science Center in northwestern New Mexico has identified microirrigation components that will function adequately under substandard pressure conditions typical of rainwater catchment systems or of tanks hauled to remote sites in trailers or pick-up truck beds, etc. This information can be used to facilitate the selection of suitable components and provide information on flow rates and system efficiencies for use in irrigation scheduling when using these low pressure systems.

Hatch funds were used with other funds to carry out research on acequia system hydrology and socioeconomics, in cooperation with a team of investigators. Sustainability of acequia systems to new stressors is being explored through translating disciplinary understanding into a uniform format of causal loop diagrams to conceptualize the subsystems of the entire acequia-based human-natural system. Four subsystems are identified: hydrology, ecosystem, land use/economics, and sociocultural. Important linkages between subsystems were revealed as well as variables indicating community cohesion (e.g., total irrigated land, intensity of upland grazing, mutualism).

Research by AES scientists led to the integrated development of standard and molecular biology approaches for the monitoring of risks associated with collection and treatment of municipal wastewaters, dairy farming systems, and surface waters. It also allowed expansion of collaborative activities within the university with researchers from the departments of Biology and Engineering and outside the university with researchers from the Universities of California, Kansas, Kentucky and Guelph. The results and developed protocols were directly employed to answer similar relevant questions in subsequent projects targeting algal biofuel systems suggesting their validity and are currently used to develop testable and fundable hypotheses relevant to environmental quality of the Southwest, and thus a range of local stakeholders.

The timing and amount of irrigation water is critical to the optimum production of pecans however, there are few tools available to estimate water use compared to deep percolation below the root zone. The RZWQM2 model was compared to the daily water balance method at two flood-irrigated mature pecan orchards with different soil textures and depths to water table, in the lower Rio Grande Valley near Las Cruces, New Mexico. A spatial variability study was conducted to identify the areas where remediation is needed and suggest sustainable management strategies to reduce the effect of treated saline and sodic wastewater application on soil environment and existing native vegetation based on the spatial variability of soil physical and chemical properties. The project results demonstrate that about 25-37% of water can be lost to deep percolation. The contour maps of soil properties along with their spatial structures can be used in making better future sampling designs and management decisions in the west mesa site irrigated with treated wastewater.

A 4-yr field study evaluated the effects of land-applied, treated, saline-sodic industrial wastewater on a Chihuahuan Desert shrubland. Land application (irrigation) increased soil N, P, and K fertility, but along with increased soil pH, sodicity, and total salinity. Cumulative land deposits of Na, Cl and CaCO_3 -equivalent alkalinity reached 27 Mg after 4 yr. An additional 2 Mg of combined vegetation biomass had accumulated on an irrigated plot compared to an adjacent non-irrigated plot. Fruit dry matter of the irrigated shrubs, *Larrea tridentata* and *Prosopis glandulosa*, was increased by up to 15-times above that on the non-irrigated plot, with no increases in total shrub biomass. As sodicity increased on the irrigated plot, the herbaceous *Lepidium alyssoides* became increasingly dominant on the shrub interspaces, while six other herbaceous species declined. This study is the first to report environmental impact of land applying treated industrial wastewater on a Chihuahuan Desert landscape. Adoption of similar land application practices by other New Mexico towns could reduce salinization of the Rio Grande from conventional wastewater treatment plant outflows by 5% to 10% while providing financial benefits through cost-effective wastewater processing.

New Mexico Cooperative Extension continues to increase their volunteer base and work with programs to build strong foundations for positive economic and environmental impacts. Program growth fluctuates yearly depending on the volunteer leadership available. Last year there were increases in water, soil, and agriculture programs. Requests for soil testing and interest in composting and water management are being considered. Ranch and home visits address weeds, grasses, livestock management techniques, feed supplements, urban horticulture and integrated pest management. 4-H played a major role when they took the top wildlife judging team to nationals and placed fifth in the nation. Below are highlights from

several New Mexico county Extension programs and state specialist educational efforts.

Gardening groups continue to utilize Extension faculty and staff at an increasing level. Talks range from local garden club programs to container gardening and site-specific walks and nature hikes. Questions addressed include pest management, diseases, crop rotation, changing climatic conditions, and best gardening skill practices. Agents and specialists provide information in print and online so clientele can share the information with others. Beyond the public appearances and home visits, phone calls, emails, and walk-in questions continue to increase. Agents expand their outreach by training Master Gardeners, providing radio and newspaper talks and columns and referring all less-technical questions to trained staff and Master Gardeners.

Agents and specialists held pesticide applicator trainings providing 5 continuing education credits (CEU) to local and regional agriculture producers. The agent hosted a private applicators pesticide test to certify local producers. Producers appreciated that trainings were held close to their homes; saving on travel expenses. Agents, working with three local pest control companies, monitor pest populations; and make home visits to identify pests that need to be managed.

Last year range management help was in high demand due to lack of rain. Livestock producers received advice on feed, supplements and forage information, and assistance in getting their livestock to market. The agent makes ranch and farm visits throughout the year. The agent works with Farm Services Agency (FSA) and Natural Resources and Conservation Services (NRCS) to assess the grazing losses in counties. Agents provide the information on pasture conditions and stock numbers. Agents work with the New Mexico Livestock Board on a program to educate people about abused horses. One agent wrote 2 newspaper articles explaining the feed intake of horses and the amount of water that is needed for them to live. Five horses were placed in rescues and 2 more fostered out in one county.

Interest in solar energy technologies for farm and ranch operations is growing. In one county the agent trained 60 producers last year resulting in five producers putting solar systems into their operations. This has been a hit with the agent who has a waiting list when he holds a class.

Agents and specialists carried out the second annual youth ranch management camp held at Valles Caldera. Youth who attended the camp began their careers as ranchers. They learned everything from cutting meat to how to collect range forage samples. Youth and instructors learned skills that can be taken back to their counties. Youth gave feedback to instructors at the end of the camp stating how the camp helped them with all aspects of the ranching business.

Lea County hosted a thirteen week Master Gardener's program course. Participation increased 7.5%. Many of the topics are relevant to the county or pertain to questions that have been received throughout the year by the agent. Each year agent receives the assistance of certified MG's in conducting the program. Currently, Lea County has 56 certified gardeners to utilize. They assist in many capacities including landscaping for historical sites, preparation of horticulture judging teams, home and garden competitions at the annual county fair, and assisting the agent on various questions throughout the year. The certified MG's publish a monthly newsletter that is sent throughout the county and to local newspapers and radio stations advertising their availability and support for Lea County and the extension service.

The Master Gardeners of Lea County hosted its 1st Annual Water Wise Conference. This program focused on utilizing water effectively in the Desert Southwest. Four presenters conducted two programs each. The program was received well with hopes of hosting another program next year. Organizers were very pleased with the turn out and excited about the feedback received after the one day program.

The 21st annual Pesticide Applicators Training (Ornamental and Turf Workshop) was held on the campus of New Mexico Jr. College. There were two main areas of interest: individuals seeking the skills and knowledge to obtain an applicators license; and those who have a license and are seeking to gain the

required number of CEU's. The workshop assisted many residents throughout the state. Many municipalities were represented (Hobbs, Lovington, Eunice, Jal, Carlsbad, Artesia, Portales, Roswell, and Clovis).

2. Brief description of the target audience

Target audiences include:ranchers, farmers, urban landscapers, park departments, state and federal agencies, private homeowners, and recreational users of parks, forests, and waters.

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2012	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	0	0	0	0

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

Patent Applications Submitted

Year: 2012

Actual: {No Data Entered}

Patents listed

{No Data Entered}

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2012	Extension	Research	Total
Actual	3	5	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- The specific output measures will vary according to the specific project being monitored. The development of research procedures and technology, training of students, publishing research papers, and disseminating research results via educational workshops, conferences, and Extension media are important outputs for the various projects falling under this planned

program.

Year	Actual
2012	0

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	# of trained professionals
2	# of research publications
3	# of Extension publications
4	% of people adopting NMSU recommendations

Outcome #1

1. Outcome Measures

of trained professionals

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

{No Data Entered}

What has been done

{No Data Entered}

Results

{No Data Entered}

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
103	Management of Saline and Sodic Soils and Salinity
121	Management of Range Resources
123	Management and Sustainability of Forest Resources
135	Aquatic and Terrestrial Wildlife
405	Drainage and Irrigation Systems and Facilities
605	Natural Resource and Environmental Economics

Outcome #2

1. Outcome Measures

of research publications

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	45

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
103	Management of Saline and Sodic Soils and Salinity
121	Management of Range Resources
123	Management and Sustainability of Forest Resources
135	Aquatic and Terrestrial Wildlife
405	Drainage and Irrigation Systems and Facilities
605	Natural Resource and Environmental Economics

Outcome #3

1. Outcome Measures

of Extension publications

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	13

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
103	Management of Saline and Sodic Soils and Salinity
121	Management of Range Resources
123	Management and Sustainability of Forest Resources
135	Aquatic and Terrestrial Wildlife
405	Drainage and Irrigation Systems and Facilities
605	Natural Resource and Environmental Economics

Outcome #4

1. Outcome Measures

% of people adopting NMSU recommendations

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

{No Data Entered}

What has been done

{No Data Entered}

Results

{No Data Entered}

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
103	Management of Saline and Sodic Soils and Salinity
121	Management of Range Resources
123	Management and Sustainability of Forest Resources
135	Aquatic and Terrestrial Wildlife
405	Drainage and Irrigation Systems and Facilities
605	Natural Resource and Environmental Economics

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

Continuing severe drought in New Mexico hampered research efforts.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

The majority of adult program evaluations carried out by New Mexico Extension agents and specialists are pre-post and post-program knowledge gain instruments. The majority of youth (primarily 4-H club) program evaluations are demonstrations of knowledge gained and applied in teaching others, competitive events, and climbing 'youth career ladders'. Rarely, if at any time, does an agent or specialist report that participant knowledge attained/gained was less than satisfactory. One can only assume that knowledge gain survey questions are fairly worded, and that audience participation was not mandatory. The only exception to this is with Master Gardener and Integrated Pest Management qualification exams. But again, participation is initially by application and the desire to learn and apply what is learned.

Key Items of Evaluation

What is interesting to note is that most Extension faculty now use goal setting, program objectives, and evaluation instruments in their program plans (as opposed to 10 years ago, when there was a great degree of resistance). The next step in program evaluation is to assist Extension agents and specialists to develop precision evaluation instruments. On-going training, such as the Western Extension Cohort (Evaluation) Training (WECT), needs to be organizationally supported and participation needs to be encouraged by all Extension faculty.

Also, the American Evaluation Association has an Extension group section and should become a legitimate and heavily encouraged professional Extension association. The Association does more than any other organization to encourage evaluation 'best practices.'

V(A). Planned Program (Summary)

Program # 3

1. Name of the Planned Program

Agricultural Markets, Trade, and Economic/Business Development

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
511	New and Improved Non-Food Products and Processes	5%		5%	
601	Economics of Agricultural Production and Farm Management	25%		25%	
602	Business Management, Finance, and Taxation	20%		20%	
603	Market Economics	10%		10%	
604	Marketing and Distribution Practices	10%		10%	
606	International Trade and Development	5%		5%	
608	Community Resource Planning and Development	15%		15%	
610	Domestic Policy Analysis	5%		5%	
611	Foreign Policy and Programs	5%		5%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2012	Extension		Research	
	1862	1890	1862	1890
Plan	4.9	0.0	7.0	0.0
Actual Paid Professional	3.0	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
220501	0	454857	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
22051	0	454857	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

New Mexico Agricultural Experiment Station researchers are exploring and identifying possible value-added products made from New Mexico agricultural commodities, to examine current production and marketing tools available for value-added agriculture operations, and identifying and evaluating existing marketing channels that can be used to market New Mexico agricultural products. Consumer preferences for regional certification, including willingness to pay estimated using data from a national on-line panel. Stakeholder input including willingness to participate obtained via multiple focus groups. If certification program found to be feasible and industry stakeholders agree to participate, certification program could increase market for New Mexico grown and/or processed chile. It is possible that growers and processors could receive a price premium with the successful implementation of a certification program. Researchers are also examining consumer nutritional knowledge of popular nut varieties, with an emphasis on pecans using nationwide panel survey. Findings can be used to by stakeholders to analyze the effectiveness of industry marketing efforts. Survey will allow researchers to identify how increased knowledge influences consumer pecan purchase intentions, including willingness to pay for nuts that have higher nutritional content. Additionally the economic effectiveness or profitability of improved pecan production practices associated with higher pecan nut nutritional content is schedule to be examined. Pecan industry stakeholders will better understand pecan consumers including basic nutritional knowledge, nutritional information and knowledge's impact on consumption patterns, and consumer's willingness to pay for additional nutrition value that may be created via alternative production practices, e.g., tree canopy thinning.

Hedonic ranch models developed for New Mexico provide ranch buyers, sellers and lending personnel data about trends in land value and an exploration of those factors that have influenced ranch prices. NMSU research report 779 updated earlier models and documented the improvements and progression on hedonic ranch value models developed since 1986. Trends in New Mexico grazing land values have been tracked for 26 years through Agricultural Experiment Station research funding.

Ranch Horse clinic and competition help ranch horse owners and trainers with refining skills of training horses used on a working cattle operation. It also provides the opportunity for those participants to exhibit and compete and join the newly formed Ranch Horse Association. Participants rated the clinic highly with 98% showing measurable improvement and knowledge gained. Last year's clinic concluded with a ranch cutting competition.

Equine training plays a very important role in 4-H Horse Project and Equine Management enthusiast.

Since Navajo philosophy of Horse education plays a major role, the agent provided and assistance to clientele, and conducted equine safety, philosophy of traditional/cultural teaching, dental work, hoof care, nutrition, and horsemanship to promote safe and proper handling of horses. The workshops are conducted to help 4-H youths/adults/parents and leaders learn more about horses so they may assist their children/community members with their projects. Last year agents, with other horsemen, conducted trainings to promote Equine management, and traditional teaching values of the horse. Forty five clinics are conducted through-out the state and the tribal reservations.

Traditionally the Jicarilla Apache are horse people. The horse holds a special place in the culture of the Jicarilla. Many of the Jicarilla Apache are horse owners. There are approximately 1000 head of wild horses on the reservation. In recent years there has been a drifting away of utilizing the horse by the younger generations on the reservation. While this is true the horse remains one of the best teaching tools to not only reach the youth but also to reach the adults in the area served. The "Hands on" form of instruction remains the most effective for Jicarilla clientele.

The goal of the Jicarilla Extension Program is to utilize the horse as an instruction tool. It is also the goal of this program to develop horse educational programs that can be replicated or utilized on other reservations as well as off reservation programs.

In keeping with the goals and objectives set forth in the 2011 Federally Recognized Tribes Extension Program Grant, last year we addressed profitable ranching techniques, youth development, and management practices that mitigate the effects of drought by conducting a horse castration clinic in October covering safety, tools, process, follow up, traditional and cultural horse considerations, the effects of wild horses and controlling the horse population on the reservation. As a result of this clinic 20 horses have been castrated, saving an average of 3600 lbs. of forage, 4000 lbs. of hay per offspring and a cost of \$480. Assuming each would have bred just once; that is 80,000 lbs. of forage and \$9600 in savings for hay.

Colt starting clinics, a program covering basic communication with the horse, is presented by Agents. With 10 individuals implementing techniques learned on 10 animals; that is a savings of \$500 per animal for a total of \$5,000 to ranch programs, plus this number will multiply as additional horses are purchased and trained by tribal horse owners.

A horse camp is held, with instruction being provided in 5 areas: riding, horse health, communication, cultural horse, and bullying and suicide prevention. There were 107 youth participants, a 100% increase from previous years. This effort is a collaborative effort with volunteers and monetary sponsorships from tribal programs and departments including Healthy Native Community Coalition, Jicarilla Health and Fitness Department, Jicarilla Behavioral Health, Jicarilla Apache Legislative Council, Jicarilla Wild Horse Casino, Jicarilla Community Center, and Jicarilla Youth Department.

Open Arena/4-H horsemanship practices are conducted from June through September. Youth are divided into three groups depending on their individual skill level. The groups are beginner, intermediate, and advanced. These group divisions are made regardless of age and are based solely on ability. Instruction is provided in parts of the horse, tack, basic horse riding, horse training, horse communication, leadership, community service, volunteerism, and the various horse related events in rodeo. Healthy snacks are provided for participants and they are given instruction on the importance of eating healthy and feeding our horses a healthy diet.

Last year Jicarilla Country Family Fair and Rodeo took place as a result of the success of the open arena practices. A fair/rodeo to show what the youth and adults learn over the summer was held. Awards are given to winning participants. Due to the success of this program, we have been asked to continue this Country Family Fair and Rodeo as an annual event and also to hold other rodeos. This has been an excellent way to reach the community, as well as promote family activities and extension education.

Programming and partnership development with the New Mexico Beef Cattle Performance Association reached beyond the annual Eastern New Mexico Tucumcari Bull Performance Test this past year. Items that increase cooperators' knowledge include Bovine gene markers for tenderness, rib-eye ultrasound, bovine trichomoniasis and feed and nutrition science. Participants agree that these extra management practices create positive results on the marketing of their respective bull breeds. After last year's program, sponsored by NMSU Extension, participants stated they would use gene marker technology for their next selection criteria of herd sires.

Across the nation, beef producers face the challenge of making a living from the land, while producing safe, wholesome beef. The industry's Beef Quality Assurance (BQA) Program was created in 1987 to assist beef producers in raising, feeding and harvesting high quality beef. Extension Service conducts BQA trainings and certifications to the tribes of Southern Ute, Jicarilla, Hopis, Jemez, Laguna, Acoma, and Navajo. As a consequence of participating in the BQA program, The Navajo Nation Department of Agriculture now requires all tribal ranch program participants to be certified and adopt BQA production practices. The entire focus of BQA programs centers around good business management practices and incorporates current Federal Department of Agriculture, Environmental Protection Agency, and U.S. Department of Agriculture regulations. There are approximately 125 certified participants with The Navajo Nation and approximately 100 in the other tribes.

The Annual Four Corners Beef Symposium agenda covered areas such as "What's Driving the Cattle Market?", "Leaving a Lasting Legacy", Vaccination Programs and Protocol, Native and Non-Native Poisonous Plants, and Calving Difficulties. Agents are responsible for developing the agenda (in conjunction with the Colorado State University Extension Agents involved), contact the speakers, and serve as moderators.

2. Brief description of the target audience

The target audiences include agricultural producers, business owners, and policy makers.

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2012	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	0	0	0	0

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

Patent Applications Submitted

Year: 2012

Actual: {No Data Entered}

Patents listed

{No Data Entered}

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2012	Extension	Research	Total
Actual	2	2	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- The specific output measures will vary according to the specific project being monitored. The development of research procedures and technology, training of students, publishing research papers, and disseminating research results via educational workshops, conferences, and Extension media are important outputs for the various projects falling under this planned program.

Year	Actual
2012	0

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	# of research publications
2	# of Extension publications

Outcome #1

1. Outcome Measures

of research publications

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	8

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
511	New and Improved Non-Food Products and Processes
601	Economics of Agricultural Production and Farm Management
602	Business Management, Finance, and Taxation
603	Market Economics
604	Marketing and Distribution Practices
606	International Trade and Development
608	Community Resource Planning and Development
610	Domestic Policy Analysis
611	Foreign Policy and Programs

Outcome #2

1. Outcome Measures

of Extension publications

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	2

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
511	New and Improved Non-Food Products and Processes
601	Economics of Agricultural Production and Farm Management
602	Business Management, Finance, and Taxation
604	Marketing and Distribution Practices
608	Community Resource Planning and 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

New Mexico continues in serve drought and economic downturn.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

The majority of adult program evaluations carried out by New Mexico Extension agents and specialists are pre-post and post-program knowledge gain instruments. The majority of youth (primarily 4-H club) program evaluations are demonstrations of knowledge gained and applied in teaching others, competitive events, and climbing 'youth career ladders'. Rarely, if at any time, does an agent or specialist report that participant knowledge attained/gained was less than satisfactory. One can only assume that knowledge gain survey questions are fairly worded, and that audience participation was not mandatory. The only exception to this is with Master Gardener and Integrated Pest Management qualification exams. But again, participation is initially by application and the desire to learn and apply what is learned.

Key Items of Evaluation

What is interesting to note is that most Extension faculty now use goal setting, program objectives, and evaluation instruments in their program plans (as opposed to 10 years ago, when there was a great degree of resistance). The next step in program evaluation is to assist Extension agents and specialists to develop precision evaluation instruments. On-going training, such as the Western Extension Cohort (Evaluation) Training (WECT), needs to be organizationally supported and participation needs to be encouraged by all Extension faculty.

Also, the American Evaluation Association has an Extension group section and should become a legitimate and heavily encouraged professional Extension association. The Association does more than any other organization to encourage evaluation 'best practices.'

V(A). Planned Program (Summary)**Program # 4****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
501	New and Improved Food Processing Technologies	50%		50%	
502	New and Improved Food Products	5%		5%	
503	Quality Maintenance in Storing and Marketing Food Products	25%		25%	
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins	20%		20%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2012	Extension		Research	
	1862	1890	1862	1890
Plan	1.5	0.0	0.5	0.0
Actual Paid Professional	1.0	0.0	1.4	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
68000	0	104074	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
68000	0	104074	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

The inclusion of a student-run food company in the curriculum for the B.S. in Food Science and Technology has given students a hands-on learning environment in which to apply the principles of food science and technology to the real-life production of food products. Upon graduation, students in the program will have at least some experience in all aspects of a food manufacturing company which they can then take with them into their jobs.

AES culinary faculty continue to move into research areas important to southern New Mexico's restaurant operators. They completed a study of beer festivals and a study of culinary training in the past year, and began research into succession/or sale of successful operations, an expanded study of culinary education, and expanded food service training in food allergies.

Extension

The Hidalgo County Extension Office has purchased a large selection of outdoor cooking equipment that is being used to teach kids. Agents teach day-long outdoor cooking tracks that cover food safety, knife skills, food preparation, and cooking safety. The youth participants learn many new skills related to cooking. They also prepare lunch and dinner for approximately 150 people. Youth learn the importance of food safety and become comfortable using a large chief's knife to prepare food as well as increase their skill level on outdoor cooking equipment.

Operation Military Kids (OMK) Camp is held over the summer. The camp is designed for kids with deployed parents. Agents developed a program that consists of a knife skills workshop where youth prepare a snack using chief knives, then continue with indoor gardening. Youth paint terracotta pots earlier in the week, during a 'coping through art' project, that are used to pot herb plants. Youth learn what it takes to care for their newly planted herbs as well as the benefits of having plants indoors; such as stress reduction and air purification. The workshop includes a demonstration on worm composting, carbon footprints, and using solar pumps to water a small garden.

The next day's workshop at the OMK camp includes a cooking class. The class starts with a food safety presentation where participants increase their knowledge of safe food handling procedures that include hand washing, food preparation and proper cooking and food holding temperatures. The workshop then moved to making lunch for the camp members and staff. Youth prepare a meal of cultural New Mexican foods. The menu is designed to teach youth how to prepare cultural foods and incorporate an 'eat locally' theme. When grass fed beef (from a local producer) is used to make street tacos, a discussion is held that highlights the different methods of raising beef as well as the nutritional differences. Vegetables used to make the Calabacitas (Squash), a salad, and garnishes for the tacos are picked right out of an onsite garden or come from the local farmers' market. A discussion is held on the distance most food travels from farm to plate and how eating local produce helps the local economy and cuts down on the carbon foot print. The same herbs that were planted in the pots the day before are used to prepare lunch, giving the youth a chance to use them in a real life cooking situation. Discussions during the workshop lead to questions about the different uses for fresh herbs, how locally produced food is better for the environment, how else to use the ingredients, and methods learned to prepare meals for the youths' families.

Participants learn the safe use of knives, Dutch ovens, and other outdoor cooking equipment, different cattle producing operations and the methods used to raise beef, grass fed beef, locally produced vegetables, taste testing, growing their own foods, how to prepare meals using fresh herbs, the benefits of gardening, and how to prepare a small home garden. Life skills are highlighted throughout the workshop, preparing youth to handle everyday challenges. Youth leave the workshop excited to return home and teach their families what they learn in both gardening and cooking. The design of the OMK camp is to teach participants different methods for dealing with the stress of having a deployed parent. This workshop teaches them life skills and gives them tools to use at home to find their creative outlet as a positive stress relieving activity. Many campers say that they now have the skills to prepare meals for the family which would greatly reduce the work and stress load of their parents. The campers leave the workshop confident and ready to make a difference in their families' lives.

Home Economists hold six trainings on food preservation. These workshops are conducted to meet individual interests in home canning methods. The skill levels of the participants range from those that have never canned before to those that have not canned in more than 10 years. In class evaluations, 80% of participants have stated that they gained knowledge and new facts about canning and 90%, rating the quality of the presentation informative and enjoyable. Comments include "The pressure canning was actually easier than I anticipated", "I had a great time canning and making new friends", "I am now confident enough to can at home", "Great class, I learned a lot, great job, thanks."

The Shiprock Cooperative Extension Service hosts the Fall Agriculture conference at the Shiprock chapter house annually. Topics include healthy living, community gardens, livestock vaccinations, livestock culling, food preservations, and local food marketing. Home economists have agreed to assist with food preservation presentations during the conference. New for this year was the fall farm tour that takes place the day before the conference. The tour include two farms and one community garden in the Shiprock area, information on how to apply for land permits, accessing water for your farm or garden, working with crops, setting up your water system, growing food for your family, and helpful farm and garden tools and tips. Agents were invited to do NMSU tribal extension presentations and share recipes.

Participants receive handouts on "How to Freeze," "Food Preservation", "Drying Foods", and recipes on non-common plants like egg-plant and spinach. The recipes were requested by local farmers who wanted information on how to cook these garden plants. The agents share their roles as an Extension agent working for NMSU tribal extension program. In conclusion, participants increase their awareness of NMSU tribal extension and how to prepare simple recipes.

Agents conduct demonstrations on food preservation methods which had been requested by participants at previous years' conferences. They demonstrate strawberry jam canning; along with a display of the canning materials needed and step-by-step instructions. The educational materials used are the Ball Canning book and NMSU Cooperative Extension Service canning guide and food safety. Participants increase their awareness of how food preservation benefits their families.

This past year home economists offered a "Money Management" training focusing on how to manage personal finances. Participants learn the importance of identifying needs vs. wants, budgeting, and saving. They receive handouts on "Managing your Money: Where do I start", "Managing your Money: Where does the money go?", "Managing your Money: Keep records in order", "Managing your Money: Stop Spending Leaks", and information from Dollar Counts. These efforts increase awareness of basic money management concepts.

Basic nutrition concepts are important for elementary school youth as they learn to make their own meal and snack choices while away from home. Young students grasp the concepts of the basic food groups, and foods within those groups, best with hands-on activity. Each year the students are asked to help "build" a large fabric cheeseburger model to illustrate the five food groups found in the cheeseburger.

The students enjoy learning about the new USDA MyPlate guidelines as they relate to a variety of food choices. Basic nutrition handouts and easy-to-make recipes are given to students to take home to share with their families. After the presentation, the students enjoy "food group kabobs" made with ham, cheese, bell peppers, pineapples, and bread cubes, and receive fruit and vegetables stickers. Following these presentations students seem to make a more conscience effort to choose healthier foods.

Home economists initiated the Colfax County Food Protection Alliance/Task. Following meetings held in July and September, 13 members had joined the task force. Individuals represent the NM Environment Department, Mora/Colfax Head Start, Miner's Colfax Medical Center, Higgins Environmental Consulting, the NM Livestock Board, WIC, the NM Department of Health, K-Bob's Restaurant, Raton HS Culinary Arts Department, the Raton Middle School Family and Consumer Science Department, the local American Red Cross, and the First Street Farmers' Market. Participants discuss the background leading to the development of the county's, "grass roots" based food protection alliance. They learn the purpose of the alliance to develop a network to better respond to food protection and safety incidents, resources that could be used to address a food safety event, potential threats to our food supply along the I-25 corridor, and training or educational needs for the alliance and the general public.

Food safety news releases, educational materials, radio broadcasts and communication among members are means by which consumers increase their knowledge of general food safety information, and food recalls and incidents such as the recent foodborne illnesses related to cantaloupe grown in Southeastern Colorado. Last year three members and the home economist attended the 2nd Annual State Food Protection Alliance Conference which was held in Albuquerque.

Adult Home Economists responded to requests for food preservation demonstrations at the Ku-Tips Nursery in Farmington. The demonstrations include steps to make easy freezer and refrigerator jams, as well as safely and properly canning jams and jellies using the hot water bath canner. Samples of each product are shared with the audience as the home economists answers food preservation questions.

Home economists stepped in to handle all food safety and food preservation clientele phone calls, walk-ins and requests for testing dial gauge pressure canners for accuracy and overall safety. Seventeen dial gauges from clientele in Farmington, Aztec, Bloomfield, and La Plata were tested. While the majority of the dial gauges were recommended for safe use, five gauges needed to be replaced before canning low acid foods in the pressure canner. In addition, approximately 50 clientele calls were answered regarding requests for canning recipes, safe handling procedures and methods, and general food safety questions. The home economist purchased Ball Canning Guides for clientele wishing an additional resource, to accompany the NMSU-CES canning guides. These efforts help insure that families follow USDA approved food preservation techniques and use recipes and methods that will result in a safe home canned product.

Agents work to ensure food safety market viability of commercially processed foods by providing nutritional panel for food labels (this service is not provided in all states); providing the food industry with nutritional panel service on a timely basis; providing nutrition panel graphics for each product submitted; and providing nutritional panel for food labels for food processors annually from NM, TX, AZ and other parts of the U.S.

Work in this area focuses on development or improvement of methods, techniques, or processes to maintain or improve quality or functionality, stabilize or preserve foods, or prepare foods for further processing. This also includes understanding and minimizing food quality losses during preservation, storage, distribution, and marketing to enhance the quantity and quality of foods delivered to consumers, minimize food cost, and enhance profitability for food producers and marketers. In addition, this area includes work on pathogenic foodborne microorganisms and parasites in raw, minimally processed, or inadequately processed and preserved foods.

Experts from various fields are collaborating to review existing Good Agricultural Practices (GAPs) educational and instructional materials, seek to identify and fill any areas where information is lacking to have comprehensive educational programs on food safety for food production. Produce Safety Alliance is a group of farmers, researchers, state officials, produce industry experts and others, working on several committees developing a nationwide curriculum to increase understanding of the principles of GAPs and to facilitate the implementation of food safety practices on fresh fruit and vegetable farms and in packing houses. They hold monthly collaborative conference calls to review food safety materials dealing with fruit and produce.

Agents developed Powerpoint presentations for course training materials demonstrating the dynamics heating and cooling of food products. This course is designed to provide answers and information to people in all phases of food production. The class covers anything from recipe development and food safety issues to marketing of food products. The training is a week-long course offered by the Taos Economic development corporation where students attend 30 hours of classes on food product development, marketing and business management. The food technologist presents material on food safety, food microbiology and food labeling.

Seminars and display presentations are done throughout the state to increase awareness of food safety issues associated with fresh produce and farming practices.

NM regulations have been changed to allow processing of non-potentially hazardous foods under certain conditions in residential home kitchen. People choosing to use this option must understand the rules and limitation of the new regulations.

Agents develop and provide training on the rules and regulations for home-based food business.

They collaborate with NM Department of Environment to develop curriculum on new regulations and trained home economists on the rules and regulations for home based food business based on developed curriculum.

Agents provided HBFB training for Socorro county potential food processors and trained home based food business operators selling new food products. A dedicated webpage for Home based food processors with training curriculum modules and regulations, applications, and inspection forms was created.

Agents are presenters for the Shiprock Agriculture day's conference held at the Shiprock Chapter house. The agents prepare power point presentations on "Food safety" and educate the community members in attendance about the importance of food safety - especially when handling foods. Ideas in proper ways to defrost, freeze, dispose food, separating vegetables and meats etc. are shared. Educational materials focusing on food safety are available to the community to incorporate in their daily lives. The agents give the fridge thermometers and a meat thermometer as participation prizes. These efforts have resulted in an increased awareness of basic food safety benefiting families in the home.

2. Brief description of the target audience

Target audience is food processors in Arizona, Colorado New Mexico, Texas, and Utah.

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2012	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	0	0	0	0

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

Patent Applications Submitted

Year: 2012

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2012	Extension	Research	Total
Actual	1	1	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- The specific output measures will vary according to the specific project being monitored. The development of research procedures and technology, training of students, publishing research papers, and disseminating research results via educational workshops, conferences, and Extension media are important outputs for the various projects falling under this planned program.

Year	Actual
2012	0

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	# of trained professionals
2	# of research publications
3	# of Extension publications
4	% of food processors using NMSU for their food product development

Outcome #1

1. Outcome Measures

of trained professionals

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

{No Data Entered}

What has been done

{No Data Entered}

Results

{No Data Entered}

4. Associated Knowledge Areas

KA Code	Knowledge Area
501	New and Improved Food Processing Technologies
502	New and Improved Food Products
503	Quality Maintenance in Storing and Marketing Food Products
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins

Outcome #2

1. Outcome Measures

of research publications

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	2

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
501	New and Improved Food Processing Technologies
502	New and Improved Food Products
503	Quality Maintenance in Storing and Marketing Food Products
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins

Outcome #3

1. Outcome Measures

of Extension publications

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

{No Data Entered}

What has been done

{No Data Entered}

Results

{No Data Entered}

4. Associated Knowledge Areas

KA Code	Knowledge Area
501	New and Improved Food Processing Technologies
502	New and Improved Food Products
503	Quality Maintenance in Storing and Marketing Food Products
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins

Outcome #4

1. Outcome Measures

% of food processors using NMSU for their food product development

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

{No Data Entered}

What has been done

{No Data Entered}

Results

{No Data Entered}

4. Associated Knowledge Areas

KA Code	Knowledge Area
501	New and Improved Food Processing Technologies
502	New and Improved Food Products
503	Quality Maintenance in Storing and Marketing Food Products
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Economy
- Public Policy changes
- Government Regulations

Brief Explanation

{No Data Entered}

V(I). Planned Program (Evaluation Studies)

Evaluation Results

The majority of adult program evaluations carried out by New Mexico Extension agents and specialists are pre-post and post-program knowledge gain instruments. The

majority of youth (primarily 4-H club) program evaluations are demonstrations of knowledge gained and applied in teaching others, competitive events, and climbing 'youth career ladders'. Rarely, if at any time, does an agent or specialist report that participant knowledge attained/gained was less than satisfactory. One can only assume that knowledge gain survey questions are fairly worded, and that audience participation was not mandatory. The only exception to this is with Master Gardener and Integrated Pest Management qualification exams. But again, participation is initially by application and the desire to learn and apply what is learned.

Key Items of Evaluation

What is interesting to note is that most Extension faculty now use goal setting, program objectives, and evaluation instruments in their program plans (as opposed to 10 years ago, when there was a great degree of resistance). The next step in program evaluation is to assist Extension agents and specialists to develop precision evaluation instruments. On-going training, such as the Western Extension Cohort (Evaluation) Training (WECT), needs to be organizationally supported and participation needs to be encouraged by all Extension faculty.

Also, the American Evaluation Association has an Extension group section and should become a legitimate and heavily encouraged professional Extension association. The Association does more than any other organization to encourage evaluation 'best practices.'

V(A). Planned Program (Summary)

Program # 5

1. Name of the Planned Program

Health and Wellbeing

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
702	Requirements and Function of Nutrients and Other Food Components	5%		5%	
703	Nutrition Education and Behavior	20%		20%	
704	Nutrition and Hunger in the Population	20%		20%	
724	Healthy Lifestyle	20%		20%	
801	Individual and Family Resource Management	20%		20%	
802	Human Development and Family Well-Being	10%		10%	
803	Sociological and Technological Change Affecting Individuals, Families, and Communities	5%		5%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2012	Extension		Research	
	1862	1890	1862	1890
Plan	7.0	0.0	1.1	0.0
Actual Paid Professional	2.8	0.0	1.1	0.0
Actual Volunteer	0.0	0.0	0.0	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
190807	0	172687	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
190807	0	172687	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

New Mexico Agricultural Experiment Station researchers are measuring the effectiveness of nutrition and fitness programs in New Mexico public schools. The effectiveness of the school-based programs can be measured by differences in fruit and vegetable consumption and plate waste studies are one technique to do this. The school based nutrition and fitness programs in New Mexico have great potential to reverse the trend of childhood overweight and obesity in New Mexico.

Equine assisted psychotherapy (EAP) involves the use of horses in therapeutic sessions with people. The major significant impact that is a direct effect of AES research is that individuals and families who participate in EAP make significant clinical improvements in mental health outcomes. This translates to a healthier family environment in terms of parenting and child interactions.

Extension

The Quay County Health Council was awarded a \$15,000.00 grant by the State Health Department. Requirements of this funding are that the hospital has to be a partner in the project and the other is that the project has to address health care access issues. A committee has been working for several years on developing a diabetes education center staffed by a diabetes educator to obtain funding. As the Health Council met to look at options, the diabetes center project became the most doable option because of the short turn-around in providing services. The two committees were merged and began meeting twice a month. The group is known as DAWN (Diabetes and Wellness Network). The grant proposal was written and funded, a time line was developed and a fiscal agent secured. If the objectives are met in time, the funding will be continued for 4 more years.

The program is called "Steps to a Healthy Life with Diabetes." Patients with diabetes are seen for a total of three hours by a diabetes educator over a four to six month period. The grant provides funding for patients without insurance and covers start-up costs, printing, and teaching supplies. The committee has built a business plan and is working on a sustainability plan which will include accreditation and training for a future certified diabetes educator. Agent works with both committees in a variety of areas including research, advertising, and booths at fairs.

The committee is working on developing a method for tracking A1C's over an extended period of time to evaluate the impact of the program.

Kitchen Creations Cooking School offers sessions for people with diabetes. The four meeting class gives participants a hands-on experience of preparing healthy food for themselves and their families along with lessons on Diabetes, the effects of certain foods and how to eat healthier.

Last year individuals participated in the Kitchen Creations Diabetes School classes. Evaluation statistics indicate that the diabetes cooking classes helped participants manage their diabetes by reading food labels to find the amount of carbohydrates in a food; eating at least 2 servings of whole grains per day and 2 servings of non-starchy vegetables at dinner; using the 50/50 method to control the amount of carbohydrates they eat at a meal; measuring food portions, switching to wheat bread, and using more herbs and spices to flavor foods.

Agent presents a program to the Senior Companions and Foster Grandparents titled "Eat Your Breakfast". The program discusses the research around the health benefits of eating breakfast and what a healthy breakfast includes. Handouts are geared toward the diabetic and offer options for a balanced breakfast plate. Handouts are also geared toward parents, and offer options for quick breakfast ideas. Participants learn what food options would be considered healthier and the components of a healthy breakfast.

Agents meet with clients of the Mental Health Resources Drop-in Center and talk about food selection for diabetics. Participants learn which foods are high in carbohydrates and how much of each of those foods they can have at a meal. Participants also learn that they should avoid eating junk food and drinking sodas. These tips will help them lower their blood sugar and help them feel better.

Agents work with the Small Business Development Center and the Southwest Cooperative Development Center to plan a seminar on forming co-ops to assist our struggling Food Co-op and to look at other possible co-ops. This program is incorporated into the annual seminar as a half day event. Speaker fees and lunch for participants are provided by donated funds. Speakers include representatives from the Cibola Art Cooperative and the Sweetgrass. Volunteers at the meeting discuss ways to advertise better and keep their members informed.

Classes on "Tricks the Grocery Store Uses" and "Cooking for One or Two" are combined. Participants learn techniques for reducing recipes and tips for utilizing freezers to preserve prepared food or extra ingredients for later use. Ideas for easy meals and recipes are shared. Participants learn about the research stores conduct to determine how we buy. They learn about packaging and product placement and how to avoid impulse buying target areas. They receive tips for saving money while shopping by avoiding marketing traps.

"Helping Your Doctor Help You" and "Food and Drug Interactions" participants learn tips to help them remember what questions they need to ask their doctors. Participants are provided medical record books to keep their medical information handy for their doctor. Participants learn that it is okay to be assertive and ask for information in writing and to ask the doctor to slow down so they understand the instructions. Participants are provided with a handout on common food/drug interactions and drug/drug interactions prepared by Ohio State Cooperative Extension Service. Participants learn the potential problems caused by these interactions and are cautioned to read everything that comes with prescriptions. They are also encouraged to share the list of supplements and herbal remedies they are taking with their pharmacist before starting a new medication.

Agent presents a program on Meth at the Extension Association Club Meeting. Participants learn what Meth is and some of the common ingredients used to produce it. They learn how the Meth problem is affecting them; from not being able to buy cold medicine, to the cost to the communities of dealing with the aspects of the crime. They learn how dangerous Meth trash is and how to avoid coming in contact with

Meth residue.

2. Brief description of the target audience

The target audience includes: teenage mothers, low-income families, families suffering social stress, mal- or undernourished families, diabetics.

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2012	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	0	0	0	0

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

Patent Applications Submitted

Year: 2012

Actual: {No Data Entered}

Patents listed

{No Data Entered}

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2012	Extension	Research	Total
Actual	3	1	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- The specific output measures will vary according to the specific project being monitored. The development of research procedures and technology, training of students, publishing research papers, and disseminating research results via educational workshops, conferences, and Extension media are important outputs for the various projects falling under this planned program.

Year	Actual
2012	0

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	# of research papers
2	# of Extension publications
3	# of trained professionals
4	% diabetics adopting NMSU recommendations regarding nutrition

Outcome #1

1. Outcome Measures

of research papers

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
702	Requirements and Function of Nutrients and Other Food Components
703	Nutrition Education and Behavior
704	Nutrition and Hunger in the Population
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

Outcome #2

1. Outcome Measures

of Extension publications

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	17

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
703	Nutrition Education and Behavior
704	Nutrition and Hunger in the Population
724	Healthy Lifestyle
801	Individual and Family Resource Management
802	Human Development and Family Well-Being

Outcome #3

1. Outcome Measures

of trained professionals

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

{No Data Entered}

What has been done

{No Data Entered}

Results

{No Data Entered}

4. Associated Knowledge Areas

KA Code	Knowledge Area
702	Requirements and Function of Nutrients and Other Food Components
703	Nutrition Education and Behavior
704	Nutrition and Hunger in the Population
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

Outcome #4

1. Outcome Measures

% diabetics adopting NMSU recommendations regarding nutrition

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

{No Data Entered}

What has been done

{No Data Entered}

Results

{No Data Entered}

4. Associated Knowledge Areas

KA Code	Knowledge Area
703	Nutrition Education and Behavior
724	Healthy Lifestyle

V(H). Planned Program (External Factors)

External factors which affected outcomes

- 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

The majority of adult program evaluations carried out by New Mexico Extension agents and specialists are pre-post and post-program knowledge gain instruments. The majority of youth (primarily 4-H club) program evaluations are demonstrations of knowledge gained and applied in teaching others, competitive events, and climbing 'youth career ladders'. Rarely, if at any time, does an agent or specialist report that participant knowledge attained/gained was less than satisfactory. One can only assume that knowledge gain survey questions are fairly worded, and that audience participation was not mandatory. The only exception to this is with Master Gardener and Integrated Pest Management qualification exams. But again, participation is initially by application and the desire to learn and apply what is learned.

Key Items of Evaluation

What is interesting to note is that most Extension faculty now use goal setting, program objectives, and evaluation instruments in their program plans (as opposed to 10 years ago, when there was a great degree of resistance). The next step in program evaluation is to assist Extension agents and specialists to develop precision evaluation instruments. On-going training, such as the Western Extension Cohort (Evaluation) Training (WECT), needs to be organizationally supported and participation needs to be encouraged by all Extension faculty.

Also, the American Evaluation Association has an Extension group section and should become a legitimate and heavily encouraged professional Extension association. The Association does more than any other organization to encourage evaluation 'best practices.'

V(A). Planned Program (Summary)

Program # 6

1. Name of the Planned Program

4-H and Youth Development

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
806	Youth Development	100%		100%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2012	Extension		Research	
	1862	1890	1862	1890
Plan	5.5	0.0	0.3	0.0
Actual Paid Professional	6.5	0.0	0.3	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
462784	0	149232	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
462784	0	149232	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Results from a study by AES researchers will provide baseline data regarding the number of

individuals with special needs, agent/volunteer knowledge and competency levels, programs offered and types of modifications or accommodations made. Based on information gathered, recommendations for training and development can be provided as well suggestions for marketing and promotion and program development for successful inclusion of individuals with special needs. Stage 1 showed that, according to State 4-H leaders, most states do not have means, other than self-disclosure of identifying youth with special needs in their programs. Although some programs are offered and modifications made for youth with special needs, it is typically done on a case by case basis.

An AES/Hatch project extends research on the learning impacts of integrating science and agriculture in the secondary curriculum into middle schools. Through their involvement in the Center, Memorial Middle School students are exposed in compelling ways to STEM careers including those in agricultural and natural resources sciences, creating another needed area of assessment. Eighty-nine percent of Memorial Middle School's students are Hispanic, 66% are economically disadvantaged, and 25% have special needs. Therefore, impacts on basic and agricultural and natural resource science learning; youth leadership life skills development; and STEM (including agriculture and natural resource) career interests within this unique population of youth is needed to determine if this learning model is worthy of diffusion and adoption at other middle schools with similar demographics. The results will also be used to improve the model to further enhance the outcome variables of interest.

Nearly all local clubs conduct community service projects and 85% of NM 4-H youth participate in community service projects at the county level. Examples of county community service projects include: Christmas caroling in assisted living homes, hospital baby blanket donations, highway clean-up, 'main street' beautification projects, dog washing, care packages for soldiers, pillowcases and 'baskets of hope for cancer patients, painting fairgrounds buildings, and helping out at local soup kitchens. Youth increased knowledge and skills relate to generosity and service learning, contributions to group efforts and responsible citizenship as evidenced by willingness to serve, appreciation of service opportunities and youth assuming leadership roles related to service. Youth have reported through record books that community service has provided them with a strong sense and understanding of responsibility, self-esteem, belonging, and generosity.

Focusing on the "Heart" of 4-H, the 2012 Rio Arriba County 4-H Community Service Project was dedicated to valuing and appreciating the counties aging population. The Service Project gave Valentine gifts to the residents of the Espanola Valley Senior Citizen Center. The County's clubs were asked to donate \$10 and a Valentine's Day Card. Eighty percent of the Counties 4-H Clubs participated in the project through their donations and visiting the Senior Center to deliver the gifts. Over one-hundred gifts were given as an outcome of the project. The agent assisted with the project by organizing gift drop off stations, relaying crucial information about the project to clubs, collaborating the delivery date and organizing gift purchase. The service project also inspired several 4-H clubs in the county to conduct similar activities with their local Senior Center. Many meaningful relationships were established with local community members and service organizations.

The Extension Service teamed up with local Rotary groups to bring the renowned, research based "Don't Meth with Us" awareness program to 5th graders in several counties. This program targets 5th graders and depicts visual, everyday ingredients used in Meth production along with defining the dangers, and effects of using meth. The success of this program is largely attributed to the website www.dontmethwithus.com that is available for kids and their parents to review and discuss at home as a follow up to the in-school programming.

2. Brief description of the target audience

Youth ages 5 to 19 are targeted to learn life, leadership and citizenship skills through: Project Work, Special Interest Groups, School Enrichment, Competitive Events, Fairs, Clinics, Workshops, Record Books, Camps, Community Service, Public Speaking, Elected/Appointed Offices, etc.

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2012	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	0	0	0	0

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

Patent Applications Submitted

Year: 2012

Actual: {No Data Entered}

Patents listed

{No Data Entered}

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2012	Extension	Research	Total
Actual	2	1	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- The specific output measures will vary according to the specific project being monitored. The development of research procedures and technology, training of students, publishing research papers, and disseminating research results via educational workshops, conferences, and Extension media are important outputs for the various projects falling under this planned program. Numbers of students involved in 4-H programs also will be outputs.

Year

Actual

2012

0

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	# of Research publications
2	# of Extension publications
3	% volunteers trained

Outcome #1

1. Outcome Measures

of Research publications

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	4

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

Outcome #2

1. Outcome Measures

of Extension publications

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	10

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

Outcome #3

1. Outcome Measures

% volunteers trained

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

{No Data Entered}

What has been done

{No Data Entered}

Results

{No Data Entered}

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Appropriations changes
- Public Policy changes
- 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

The majority of adult program evaluations carried out by New Mexico Extension agents and specialists are pre-post and post-program knowledge gain instruments. The majority of youth (primarily 4-H club) program evaluations are demonstrations of knowledge gained and applied in teaching others, competitive events, and climbing 'youth career ladders'. Rarely, if at any time, does an agent or specialist report that participant knowledge attained/gained was less than satisfactory. One can only assume that knowledge gain survey questions are fairly worded, and that audience participation was not mandatory. The only exception to this is with Master Gardener and Integrated Pest Management qualification exams. But again, participation is initially by application and the desire to learn and apply what is learned.

Key Items of Evaluation

What is interesting to note is that most Extension faculty now use goal setting, program objectives, and evaluation instruments in their program plans (as opposed to 10 years ago, when there was a great degree of resistance). The next step in program evaluation is to assist Extension agents and specialists to develop precision evaluation instruments. On-going training, such as the Western Extension Cohort (Evaluation) Training (WECT), needs to be organizationally supported and participation needs to be encouraged by all Extension faculty.

Also, the American Evaluation Association has an Extension group section and should become a legitimate and heavily encouraged professional Extension association. The

Association does more than any other organization to encourage evaluation 'best practices.'

V(A). Planned Program (Summary)

Program # 7

1. Name of the Planned Program

Climate Change

Reporting on this Program

Reason for not reporting

No Hatch or Smith-Lever funds are used on Climate Change activities.

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2012	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.0	0.5	0.0
Actual Paid Professional	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}
Actual Volunteer	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}

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

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}
1862 Matching	1890 Matching	1862 Matching	1890 Matching
{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}
1862 All Other	1890 All Other	1862 All Other	1890 All Other
{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}

V(D). Planned Program (Activity)

1. Brief description of the Activity

See the section on the Sustainable Management of Natural Resources Planned Program.

2. Brief description of the target audience

Undergraduate and graduate students are the target audience.

3. How was eXtension used?

{No Data Entered}

V(E). Planned Program (Outputs)

1. Standard output measures

2012	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	0	0	0	0

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

Patent Applications Submitted

Year: 2012

Actual: {No Data Entered}

Patents listed

{No Data Entered}

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2012	Extension	Research	Total
Actual	0	0	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Conduct classes on climate change.

Year	Actual
2012	0

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number of students trained.

Outcome #1

1. Outcome Measures

Number of students trained.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

{No Data Entered}

What has been done

{No Data Entered}

Results

{No Data Entered}

4. Associated Knowledge Areas

KA Code	Knowledge Area
{No Data}	null

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Economy
- Competing Programmatic Challenges

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 # 8

1. Name of the Planned Program

Sustainable Energy

Reporting on this Program

Reason for not reporting

No Hatch or Smith-Lever funds are used on Sustainable Energy activities.

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2012	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.0	0.0	0.0
Actual Paid Professional	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}
Actual Volunteer	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}

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

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}
1862 Matching	1890 Matching	1862 Matching	1890 Matching
{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}
1862 All Other	1890 All Other	1862 All Other	1890 All Other
{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}

V(D). Planned Program (Activity)

1. Brief description of the Activity

See the section on the Sustainable Management of Natural Resources Planned Program.

2. Brief description of the target audience

Students and producers are the target audiences.

3. How was eXtension used?

{No Data Entered}

V(E). Planned Program (Outputs)

1. Standard output measures

2012	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	0	0	0	0

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

Patent Applications Submitted

Year: 2012

Actual: {No Data Entered}

Patents listed

{No Data Entered}

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2012	Extension	Research	Total
Actual	0	0	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of students trained.

Year	Actual
2012	0

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	# students trained.

Outcome #1

1. Outcome Measures

students trained.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

{No Data Entered}

What has been done

{No Data Entered}

Results

{No Data Entered}

4. Associated Knowledge Areas

KA Code	Knowledge Area
{No Data}	null

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Economy
- Government Regulations
- Competing Programmatic Challenges

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 # 9

1. Name of the Planned Program

Childhood Obesity

- Reporting on this Program
Reason for not reporting

No Hatch or Smith-Lever funds are used on Childhood Obesity activities per se. Childhood obesity is part of our Human Health and Wellness activities.

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2012	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.0	0.0	0.0
Actual Paid Professional	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}
Actual Volunteer	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}

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

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}
1862 Matching	1890 Matching	1862 Matching	1890 Matching
{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}
1862 All Other	1890 All Other	1862 All Other	1890 All Other
{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}

V(D). Planned Program (Activity)

1. Brief description of the Activity

See the section on the Health and Wellbeing Planned Program.

2. Brief description of the target audience

Children, youth, and families are the target audiences.

3. How was eXtension used?

{No Data Entered}

V(E). Planned Program (Outputs)

1. Standard output measures

2012	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	0	0	0	0

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

Patent Applications Submitted

Year: 2012

Actual: {No Data Entered}

Patents listed

{No Data Entered}

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2012	Extension	Research	Total
Actual	0	0	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Conduct workshops and classes on healthy food choices.

Year	Actual
2012	0

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	# of youth adopting healthy food choices

Outcome #1

1. Outcome Measures

of youth adopting healthy food choices

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

{No Data Entered}

What has been done

{No Data Entered}

Results

{No Data Entered}

4. Associated Knowledge Areas

KA Code	Knowledge Area
{No Data}	null

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Economy

Brief Explanation

{No Data Entered}

V(I). Planned Program (Evaluation Studies)

Evaluation Results

{No Data Entered}

Key Items of Evaluation

{No Data Entered}