2010 New Mexico State University Combined Research and Extension Annual Report of Accomplishments and Results

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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 down turns, 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 tri-cultural 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 over-consumption 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 by 2007 New Mexico State University Combined Research and Extension Annual Report 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: 2010	Extension		Research	
	1862	1890	1862	1890
Plan	38.5	0.0	61.0	0.0
Actual	35.9	0.0	64.0	0.0

II. Merit Review Process

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

- Internal 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.

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 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.

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
2051028	0	1851882	0

2. Totaled Actual dollars from Planned Programs Inputs				
	Extension		Research	
	Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
Actual Formula	2051028	0	1851882	0
Actual Matching	2051028	0	1851882	0
Actual All Other	0	0	0	0
Total Actual Expended	4102056	0	3703764	0

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

V. Planned Program Table of Content

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

V(A). Planned Program (Summary)

Program # 1

1. Name of the Planned Program

Animal Production

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
301	Reproductive Performance of Animals	20%		20%	
302	Nutrient Utilization in Animals	20%		20%	
303	Genetic Improvement of Animals	10%		10%	
304	Animal Genome	10%		10%	
305	Animal Physiological Processes	10%		10%	
306	Environmental Stress in Animals	10%		10%	
307	Animal Management Systems	20%		20%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

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

Year: 2010	Extension		Research	
	1862	1890	1862	1890
Plan	3.0	0.0	6.6	0.0
Actual	2.6	0.0	7.3	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**
132100	0	252817	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
132100	0	252817	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

Animal Production

In a current studyon sheep reproductive physiology, ewes giving birth to twins increased 20 %. This would equal to 200 additional lambs for a 1000 ewe flock which would mean an additional $20,000 in potential lamb sales.

Ruminants utilize a symbiotic relationship with microorganisms residing in rumen to digest fiber into volatile fatty acids which can be absorbed and converted by the animal to energy. Ruminal microorganisms use quorum sensing to communicate in the rumen. Quorum sensing allows the microorganisms to organize and build the necessary biofilms on fibrous feedstuff. Cellular communication and the development of biofilms are necessary for the digestion of fiber. If microorganisms are not able to communicate in the rumen, then fiber digestibility decreases. There is a drive in the animal industry to understand what dietary conditions impact intercellular communication and thereby increase digestion of fibrous feedstuffs. Vibrio harveyi BB170 luminesces in response to intercellular communication and has been used in experiments to measure quorum sensing of pathogens. The objective of this study was to measure the impact of ruminal fluid on the growth of V. harveyi BB170. The effect that ruminal fluid had on the growth of V. harveyi BB170 was measured by using turbidity measurements at 600nm and comparing the growth at 24 and 48 hours. Data were analyzed using the MIXED procedure of SAS. Model included effect of dietary treatment on turbidity at 24 and 48 hours. There was no significant effect of dietary treatment on growth of BB170 ($P > 0.19$). Further analysis, such as minimum inhibitory concentration assays could be used to further characterize the response of V. harveyi BB170 to ruminal fluid.

Findings demonstrated that plasma amino acid concentrations decrease in steers exposed to an endotoxin, and suggest that the metabolic demand for essential and non-essential amino acids may increase under conditions in which the immune system is stimulated in growing beef cattle. The research demonstrated that the negative effects of inflammation and stress on nitrogen balance are not alleviated by post-ruminal supplementation of branched-chain amino acids or arginine. However, post-ruminal supplementation of branched-chain amino acids or arginine increased nitrogen retention of both healthy and immune-challenged steers. Additionally, our research demonstrated that supplementation of rumen-protected methionine to growing feedlot heifers increased animal performance and feed efficiency, but did not affect morbidity. 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).

Winter wheat pasture (small-grain pasture) is a unique and economical renewable resource in the southern Great Plains. It is available in late fall, winter, and early spring, when other forage sources are low in quality and quantity. For this reason it is the primary forage for young grazing ruminants. Therefore, improvements in performance of cattle grazing winter wheat could have a tremendous impact on producer's income and also on producer's expenses due to reduced days on feed at the finishing phase. Research results suggest that supplementing cattle grazing wheat pasture with dried distillers grains with solubles improves performance because it increases total caloric intake without affecting forage intake and digestibility.

Since whole-herd data collection systems for beef cattle are slowly developing in the U.S., applied genetic research is greatly needed to develop strategies thatprovide enhanced economic opportunities for beef producers. A multidisciplinary team of scientist with expertise in reproductive physiology and genetics

established along-term goal to understand genetic pathways regulating reproductive performance in beef cattle, with the intent of using the information to develop gene-assisted improvement programs for fertility. Research is testing the hypothesis "we can discover and test functionality of markers in chromosomes that are associated with reproductive performance in beef cattle." The markers to be evaluated will be single nucleotide polymorphisms (SNP). Access to data and DNA resources from large beef organizations is available so the hypothesis can be tested by pursuing these objectives:1) Conduct a SNP-based whole-genome scan to identify important chromosome regions associated with heifer pregnancy rate. 2) Develop data and DNA resources from large commercial beef operations for validation and technology transfer. These resource populations will be from varied commercial production systems and environments representing the U.S. beef industry. These resources allow expansion of the research efforts to include other economically relevant reproductive traits such as heifer rebreeding rate and stayability. In the past year, the project genotyped 802 Brangus heifers with the SNP-chip of Illumina (San Diego, CA; bovineSNP). This effort yielded ~54,000 genotypes across the bovine genome for QTL detection. From this effort, QTL were mapped to 30 regions on 12 chromosomes (BTA 3, 4, 5, 6, 9, 14, 16, 19, 20, 25, 26 and 29). Average frequency of the A allele for these SNP was 0.50 in this composite population compared to 0.53 in Angus and 0.47 ± 0.05 in Brahman cattle used to develop this beadchip. Nine regions were new findings for CattleQTLdb (Release 8). Two of the 7 SNP associated with birth weight also associated with longissimus muscle area and rib fat and were on BTA 5. The most notable SNP effect was on BTA 6, and accounted for 2.8% of the phenotypic variation in birth weight (35.2 ± 0.4 kg). This type of analyses were also completed for the binary heifer fertility trait, pregnant as a yearling on chromosome 2. In brief, Bioinformatic tools of www.animalgenome.org were used to visualize informative SNP (SNPlotz), QTL published for the region (CattleQTLdb), and potential candidate genes (gBrowse). Ten QTL and 10 annotations were identified in a 4 Mb region flanking the SNP inferring this QTL. Since hypothalamus is a regulatory tissue of the reproductive endocrine axis, transcriptome of this tissue was sequenced using the Illumina Genome Analyzer II and aligned with bovine genome to evaluate presence and level of expression of potential candidate genes among pre and postpubertal heifers through Alpheus®; Three genes with differential hypothalamic-expression were identified. Ontology of these genes included neuron function and cell signaling. Cummatively, these results indicate that objective 1 is being achieved. For objective 2, the collaborations also collected ~10,000 DNA-blood cards to help build DNA and phenotype resources for technology transfer and development of marker assisted breeding programs in beef cattle. Discovery of functional regions of the bovine genome will assist with design of DNA-based tools for genetic improvement of reproductive traits in beef. These tool have the potential to enhance efficiency and profitability of the beef and dairy industry.

A study was conducted to determine the effects of supplemental dietary lysine on nitrogen retention, plasma amino acid levels, and serum immunoglobulin G (IgG) levels of mature sedentary horses.The results showed nitrogen retention was not a suitable measure to determine dietary lysine requirements in mature horses. However, the observed responses in select plasma amino acid concentrations warrant further study as a means to estimate the actual dietary lysine requirement of mature horses at maintenance. Serum IgG concentrations were not influenced by the amount of dietary lysine in this study.

- 10,000 producers in New Mexico gained knowledge and understanding of lamb carcass grading, feeding and selection through educational seminars.

- Northern New Mexico sheep producers participated in wool marketing strategies to market 80,000 pounds of wool at top market price equaling $95,000.

- Producers reported a 50% increase in crop yield production due to knowledge gained on variety selection, soil preparations, fertilization and harvest practices.

- 475 new producers were certified in the Bovine Quality Assurance program.

- Over 500 cattle producers' state wide attended educational seminars and have an increased understanding of how to identify, treat and eradicate Trichomoniasis.

- Producers that attended weed control workshops and implemented practices resulted in a 90% success rate of eradication.

- Increased awareness of cow efficiency and implementation of artificial insemination techniques resulted in higher profitability.

- Producers across the state are collecting precipitation data to reflect live data in effort to decrease the lack of data going into the national drought monitor.

- 15 trappers/producers participated in the predator control program yielding 115 coyotes resulting in less livestock lost.

- $6,300 range improvements were made as a result of money from the offsite mitigation fund.

- Producers in Northeast New Mexico gained knowledge and understanding in new/innovative DNA marking technology for bull selection.

- Southwestern New Mexico Cooperative Weed Management Area attained grant funding of $166,000 to hire a coordinator to map noxious weed infestations and educate county clientele on identification.

- 90% of producers that participated in range monitoring programs showed an increased awareness of its importance.

- 997 producers across New Mexico gained knowledge in livestock/cattle marketing, vaccinations, nutrition, reproduction, herd health and Trichomoniasis.

- Producers in Northern New Mexico reflected an 80% increase in awareness of equine resources available to them.

2. Brief description of the target audience

The target audience includes: ranchers, feedlot operators, and dairy producers.

V(E). Planned Program (Outputs)

1. Standard output measures

2010	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Plan	0	0	0	0
Actual	0	0	0	0

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

Patent Applications Submitted

Year: 2010
Plan: 0
Actual: {No Data

Patents listed
{No Data Entered}

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2010	Extension	Research	Total
Plan	5	5	
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	Target	Actual
2010	0	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

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	Quantitative Target	Actual
2010	2	11

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
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	Quantitative Target	Actual
2010	1	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	Quantitative Target	Actual
2010	5	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
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	Quantitative Target	Actual
2010	2	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
305	Animal Physiological Processes
306	Environmental Stress in Animals
307	Animal Management Systems

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

{No Data Entered}

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

1. Evaluation Studies Planned

- Before-After (before and after program)
- During (during program)
- Comparisons between program participants (individuals, group, organizations) and non-participants
- Comparison between locales where the program operates and sites without program intervention

Evaluation Results

{No Data Entered}

Key Items of Evaluation

{No Data Entered}

V(A). Planned Program (Summary)

Program # 2

1. Name of the Planned Program

Food Safety

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 professional FTE/SYs expended this Program

Year: 2010	Extension		Research	
	1862	1890	1862	1890
Plan	1.5	0.0	0.5	0.0
Actual	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**
0	0	63204	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
0	0	63204	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

A study to evaluate the microbial loads of skinless, boneless chicken breasts (10 per treatment) marinated in Kraft Italian salad dressing at room temperature (22-25°C) for 1, 2 and 3 hours was completed. Total aerobic and coliform loads and Escherichia coli loads were determined before and after marinating for the designated length of time using a swab technique and PetrifilmJmicrobial plates. The microbial loads of the Italian dressing were also evaluated. The major impact from this research could be a reduction in the risk of foodborne illness from contaminated meats which may be subsequently undercooked.

Spices including dried chile pepper have been found to be contaminated with Salmonella spp. Detection of Salmonella spp. is based on conventional enrichment and isolation on selective media. Since traditional methods are time consuming and labor intensive, rapid and automated methods have been developed, but few evaluated for Salmonella detection in chile powder. Previous studies determined the rapid methods to use in the detection of Salmonella in dried red chile pepper and the other was to assess the accuracy of these methods at two inoculation levels of Salmonella artificially contaminated in red chile pepper. The VIDAS SLM method and the Neogen Reveal Device when used with the BAM pre-enrichments were equally effective compared with the BAM method for detecting Salmonella in red chile pepper powder. However, the Neogen Reveal Salmonella System was significantly less effective ($p > 0.05$) than the BAM method for Salmonella detection at the low inoculum level. Fermented chile pepper mash (Capsicum annuum cv. Mesilla Cayenne) is a major industrial food product in New Mexico. The fermentation of chile pepper mash depends on temperature, acidity, salt concentration, dissolved air, available carbohydrate and enzymes. The microbial flora involved in pepper mash fermentation has not been fully characterized. The objective of this study was to evaluate the effects of calcium chloride ($CaCl_2$) level on microbial characteristics of cayenne chile pepper mash fermentation. Nine 5 gal buckets were prepared with pepper washed and ground by the manufacturer with 15g/100g of sodium chloride and were allotted randomly to 1 of 3 treatments. Treatments were no added $CaCl_2$; 0.02g/100g and 0.04g/100g $CaCl_2$ added to the pepper mash. Aerobic plate count (Petrifilm or plate count agar), coliform counts, E. coli counts, enterobacteriaceae counts, yeast, mold and lactobacillus were not affected by $CaCl_2$ level. However, streptococcus spp. tended to linearly decrease ($P= 0.06$) with increasing $CaCl_2$ level. These results indicate that streptococci spp. might be the only microbe affected by $CaCl_2$ level. Viscosity, acidity, alcohol, soluble sugar, water activity and refractive color were not affected ($P>0.10$) by $CaCl_2$ level. However, lightness tended to decrease ($P=0.08$) while red intensity, blue intensity, contrast and hue decreased ($P <0.05$) with increasing $CaCl_2$ level. These results suggest that $CaCl_2$ added to salted pepper mash only affects color characteristics. Traditional methods of detecting microorganisms in food are time consuming and labor intensive, rapid and automated methods that have been developed must be tested in various food products. Although these rapid methods still require confirmation, the VIDAS SLM procedure was a reliable screening procedure combined with BAM Salmonella selective enrichment broth to detect Salmonella in dried red chile pepper powder. Utilizing rapid methods will improve both food processor and health official response time in the event of a food born illness associated with dried red chile pepper powder. The fermentation of chile pepper mash depends on many factors such as temperature, air, available carbohydrate and microflora is a natural process that has not been fully characterized for industrial processing. Calcium chloride is used to maintain firmness in jalapeno peppers. The theory is that added calcium can block pectin esterase activity and interact with pectin to improve viscosity and maintain soluble solids in the final pepper sauce. Additionally, the effect of calcium on microflora and microbiological characterization of lactic bacteria involved in fermentation can impact the industrial processing of pepper mash

2. Brief description of the target audience

Small food processors and families.

V(E). Planned Program (Outputs)

1. Standard output measures

2010	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Plan	0	0	0	0
Actual	0	0	0	0

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

Patent Applications Submitted

Year: 2010
Plan: 0
Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2010	Extension	Research	Total
Plan	1	1	
Actual	0	0	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	Target	Actual
2010	0	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

Not Reporting on this Outcome Measure

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	Quantitative Target	Actual
2010	1	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
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	Quantitative Target	Actual
2010	1	3

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
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

Not Reporting on this Outcome Measure

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Economy
- Appropriations changes
- Public Policy changes
- Government Regulations

Brief Explanation

The economy had the greatest impact on programs, due to appropriations allocations.

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

1. Evaluation Studies Planned

- Before-After (before and after program)
- During (during program)
- Time series (multiple points before and after program)

Evaluation Results

{No Data Entered}

Key Items of Evaluation

{No Data Entered}

V(A). Planned Program (Summary)

Program # 3

1. Name of the Planned Program

Plant and Animal Protection

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
211	Insects, Mites, and Other Arthropods Affecting Plants	10%		10%	
212	Pathogens and Nematodes Affecting Plants	25%		25%	
213	Weeds Affecting Plants	20%		20%	
215	Biological Control of Pests Affecting Plants	5%		5%	
216	Integrated Pest Management Systems	20%		20%	
312	External Parasites and Pests of Animals	5%		5%	
315	Animal Welfare/Well-Being and Protection	15%		15%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

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

Year: 2010	Extension		Research	
	1862	1890	1862	1890
Plan	1.8	0.0	11.2	0.0
Actual	5.0	0.0	9.3	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**
479732	0	442429	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
479732	0	442429	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

An ELISA technique was adapted and used to quantify titer concentrations of imidacloprid in foliage of commercial pecan orchards. Imidacloprid titer concentrations in pecan leaf and blackmargined aphid (Monellia caryella) population density measurements determined aphid resistance to imidacloprid in commercial orchards continue to increase. Results from leaf-dip studies determined that blackmargined aphid resistance levels have increased 8x from 2009 to 2010. Foliar efficacy studies support laboratory findings of increased imidacloprid resistance in western pecan aphids. A collaborative research effort was initiated during the reporting period to identify the primary mechanisms in blackmargined aphid responsible for imidacloprid resistance. Traditional primers used to identify specific insecticide resistance mechanisms in other aphid species were not successful when used on blackmargined aphid. A search for primers that will successfully isolate specific DNA or RNA areas linked to imidacloprid resistance mechanisms continues. During the reporting period a caged and non-caged replicated field study was conducted to evaluate the impact of registered and candidate insecticides on changes in thrips species in onions. In general, early season thrips populations in onions are comprised primarily of western flower thrips (Frankliniella occidentalis) with the percentage of onion thrips (Thrips tabaci) increasing as the growing season progresses. Results have yet to be analyzed.

Diorhabda elongata from Crete is established in several locations on the Pecos River near Artesia, NM. Monitoring of beetle dispersal and defoliation was conducted in 2010. Due to federal restrictions, beetles have not been moved from successful sites on the Pecos to new sites. D. carinulata from Fukang, China, established in UT and CO, have established in NW NM near Shiprock and Farmington and defoliated several thousand acres in 2010. Rhinocyllus conicus, is well-established in NM on musk thistle. Experiments to determine the impact of this beetle on the endangered Sacramento Mountains Thistle (Cirsium vinaceum) began in 2007-08. Where present, R. conicus oviposited on 95% of the musk thistle seed heads compared to 69% of the C. vinaceum seed heads. Post seed maturation evidence of R. conicus development suggests weevils may not develop well on C. vinaceum, probably due to competition with the native weevil, Lixus pervestitus and the native tephridid, Paracantha gentilis, which all but eliminated seed production at several sites. Tetrashicus spp. are chalcidoid wasps released to parasitize elm leaf beetle eggs. We investigated if Tetrastichus spp. would parasitize Diorhabda spp., an important biological control agent for saltcedar. When wasps were confined in small cup arenas, parasitization rates were 93.3% at densities of two Tetrastichus spp. wasps per egg cluster and 87% at densities of one wasp per egg cluster. Parasitization of clusters resulted in 28.4 wasps emerging per cup. When comparing the rates of parasitization separately, Tetrastichus spp. parasitized only 33.3% of the X. luteola egg clusters whereas Tetrastichus spp. parasitized 77% of Diorhabda spp. egg clusters. A choice test study between X. luteola and Diorhabda spp. had a mean of 31 wasps hatching from Diorhabda spp. eggs compared to a mean of 2.5 wasps emerging from X. luteola eggs. In a sleeve cage test on a branch of saltcedar, Tetrastichus spp. parasitized 60% of Diorhabda spp. egg clusters with an average of 3.27 wasps per egg cluster. While laboratory studies demonstrate that Tetrastichus spp. will parasitize Diorhabda spp. eggs, field tests are needed to confirm our results. We tested survival, development rate, and egg production of laboratory-fed Diorhabda on saltcedar foliage from trees that had been grown under a range of fertilizer treatments. Tissue samples from experimental trees and from the field were analyzed for % N, P, and K. Beetle larvae did not survive when fed foliage from saltcedar trees at N levels <2.0%. At levels >2.0% nitrogen, beetle larvae had increased survival rates and shorter development times. Multiple regression analyses indicated that N and P are important for larval survival and faster development rates. Higher levels of K were important for increased egg cluster production. Plant tissue analysis showed that the %N in experimental trees reflected the range of trees in the field and also that there is high variability within trees in the field. Research indicates that if beetles are released in cages on trees with poor nutrient

quality, the larvae will not survive. PARTICIPANTS: Nothing significant to report during this reporting period.

Since there was no multiple-resistance to tested alternative mode of action herbicides in the glyphosate-resistant population; therefore, these herbicides could serve as effective alternatives for control of this glyphosate-resistant Palmer amaranth population in New Mexico. Our field trials indicated that in pecan orchards, season long weed management can be achieved by Pre-emergence herbicide combinations. These alternative treatments will not only provide acceptable control of current glyphosate-resistant palmer amaranth populations but also will reduce the number of herbicide applications per growing season.We believe that this study will increase growers and our understanding of the ecology of weeds and plant pathogens under various treatments and under 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. We expect that the use of cover crops with allelopathic compounds together with mechanical weed control measures (i.e., conservation tillage, wheat straw mulch) will increase short- and long-term weed and pathogen control in the fields. 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.

A study was conducted to determine the susceptibility of a field-collected house fly strain to both commercially-available and experimental insecticidal granular baits. This study was undertaken as part of the Control and Resistance Management Tactics objective of multistate project S-1030. House flies were evaluated in an arena containing either commercial or experimental fly baits. The experimental bait performed similarly to the commercial baits resulting in 100% house fly mortality at the end of the study. However, the results demonstrated that control using the experimental product is slower and allows for multiple feedings prior to death. Therefore, many house flies consuming this bait will likely expire at sites other than the bait station location. This may lead to a misperception of efficacy and a reduced rate of adoption by industry. However, this new formulation may help delay house fly resistance development in field populations if adopted as part of a management program.

Results of greenhouse and microplot experiments to identify relationships between weeds, Verticillium, and root-knot nematodes emphasizes the importance of weed control in chile pepper fields; not only to reduce the impact of weed competition on yields, but to reduce the impact of diseases. Nematode reproduction levels were similar among chile, tall morningglory and Wright's groundcherry in greenhouse studies. Spurred anoda was a poorer host for Mi than the other species in both experiments. Co-infection with Verticillium had little effect on nematode reproduction in these experiments. These results demonstrate that all three weeds will support both pathogens, alone or in combination, without suffering pathogenic effects, and that tall morningglory and Wright's groundcherry support levels of M. incognita reproduction similar to those found in highly-susceptible chile plants. Effective management of these weeds may help reduce populations of both pathogens in future crops. Root-knot nematode resistant alfalfa has been shown to effectively suppress the nutsedge/nematode complex for a season after termination of the alfalfa. However, not all growers can produce alfalfa due to equipment needs or concerns about water availability from year to year. If we can identify cost effective, annual crop rotations that also suppress this pest complex, growers will have an additional, sustainable option for pest suppression in fields infested with these pests. 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 is becoming an increasing problem on the canals, using water intended for irrigation and obstructing water flow in irrigation canals. Effective management of this species is impossible without determining factors that influence its spread on the canals.

Etiological studies were conducted to determine the causal agents of (i) headrot on sunflower in New Mexico, and (ii) fruit rot (anthracnose) of chile pepper. Rhizopus oryzae was determined to the causal agent of headrot in sunflower. On chile pepper, the predominant fungal microorganisms associated with anthracnose on pepper fruit were Colletotrichum coccodes and Colletotrichum capsici.The impact of this research is that it provides New Mexico sunflower and chile pepper producers with information on emerging diseases, and should be useful information in preparedness for disease control in production systems.

In alfalfa, several projects are various stages of completion. We continue work on the seasonal phenology of the alfalfa weevil. Work also continues on alfalfa weevil strains in NM (with Steve Hanson) and document distribution, and biology of the pest, and are working on the problem of strain hybridization. We have completed a project on the comparative development of the alfalfa weevil strains in the laboratory. This work is the first to compare the development of all three U.S. strain under identical environmental conditions. It also compares individual feeding potential among late-instar larvae. We have created a preliminary list of the blister beetles of New Mexico. Currently, we have found ~70 species of blister beetles in the state, only 7 found in alfalfa. A more extensive study to evaluate cantharidin levels of several species of blister beetle was completed. Additional species will be added this coming year to determine potential toxicity.

We have completed field research on the impact of Lygus feeding on chile (w/ Brad Lewis). This research documents the external and internal signs of Lygus injury (both nymph and adult) to various stages of chile fruit. We have completed our research on the seasonal development of the beet leafhopper (vector of curly top virus) on weed host species (w/ Jill Schroeder and Rebecca Creamer). This project will determine the number of generations and timing of life stages of the beet leafhopper in New Mexico, as well as an evaluation of environmental factors that potentially influence leafhopper abundance (see additional report). A project this year is evaluating desert hosts to determine development of beet leafhoppers on these species as non-agricultural hostsWe have also conducted a field study on the species composition and seasonal development of flea beetles in chile over the last two seasons. These insects are very important early season defoliators of chile and no information is available on these pests in the state.

In cotton, several projects are being finalized on the impact of the western tarnished plant bug (Lygus) to New Mexico cotton. One experiment evaluated feeding injury by nymph (4th and 5th instar) and adult on individual developing squares and bolls. In another experiment, we are trying to determine economic injury levels for Lygus for New Mexico cotton. This research involves whole plant isolation of various levels (0-10 per plant) of nymph and adult Lygus to determine bug levels causing economic loss. We are also working closely with the USDA Cotton Ginning Laboratory (Paul Funk) to determine the impact of thermal defoliation on late-season insect pests causing "sticky" cotton. Our field research shows that thermal defoliation results in a significant, near-immediate termination of silverleaf whitefly populations -the worst cause of sticky cotton in the US. We have completed laboratory experiments to determine the thermal upper limits of silverleaf whitefly survival.

We have our research on the discovery of a red morph of the stink bug Mecidea minor in southern New Mexico. We also have determined the seasonal phenology and described the immature stages of this species. We currently are working on the morphology of Corimelaena incognita, and its relationship with segment fate in adult Heteroptera, and describing the immature stages of M. major.

Three parasitoids were successfully established in New Mexico. Two species are responsible for virtually all of the biological control of alfalfa weevil in southern New Mexico. Oomyzus incertus is responsible for approximately 40% of the control of alfalfa weevil in the Mesilla Valley. O. incertus and Bathyplectes spp. together often produce 70-80% control. In the Pecos Valley, O. incertus has been rare, and control of alfalfa weevil highly variable. The success of O. incertus in the Mesilla Valley suggested that

it could be successful elsewhere. Similar control would save growers in the Pecos Valley over $600,000 per year. In NM over $1 Million per year would be saved. Additional savings would be found in increased yields and reduced insecticide applications for secondary pests. O. incertus field nurseries were established in five counties at NMSU and commercial farms. We have detected O. incertus up to 10 miles from a field insectary in south Eddy County indicating that it is becoming successfully established. A number of field trials over four years were conducted on experiment station and commercial farms to determine how much impact alfalfa has on predation in pecan and cotton. Predation rates are generally high, but can be affected by distance from hay and by direction impacted by prevailing winds. Degree of predation is closely correlated with predator numbers and time of year. Cutting hay results in lower predation in nearby cotton. Data from these trials suggest that cotton relies on relatively constant immigration of predators from hay, emphasizing the importance of hay in pest management for all SE NM crops. Field trials conducted for 3 years evaluated the impact of tree size on predation of sentinel lepidopteran eggs in pecan. These trials in 3 locations over 80 miles and multiple time points from May to October indicated differences in the levels of predation by chewing vs sucking predators in small vs well established trees. Similar differences were found in borders vs interiors of orchards. Direct observation and collection of predators of sentinel eggs indicated that a spider, Hibana incursa is the most prevalent predator in pecan in the lower Pecos Valley. Yield partitioning and compensation testing in cotton indicate bollworm is rarely an economic pest in New Mexico. Bolls produced late season, most commonly lost as squares, have low value, primarily due to low natural retention, producing few bolls /acre on the later nodes. Cotton has the ability compensate by retaining squares or bolls that the plant otherwise would have shed. Less frequently, cotton can compensate by increasing lint per lock in bolls. Lower seed germination and lower lint quality in late season bolls further reduces their value. Late season boll losses on the other hand, are more of a concern, directly impacting yield. Compensation rates for early season square losses from pests like lygus are also high.

Beet leafhopper populations were evaluated each week in southern New Mexico at multiple locations fromJanuary 2008 through December 2009. Sampling consisted of weekly sweep and bucket samples and plant stem/leaf samples to determine adult/nymph and egg populations, respectively. Based on field research consisting of weekly samples over nearly two years, we found that the beet leafhopper completes 1 distinct generation (and a possible 2nd) on weedy hosts in southern New Mexico; this is considerably fewer generations than previously speculated in the literature. Our data gave us an excellent picture of the timing of adult and nymphal populations, as well as egg laying periods. We have shown that the beet leafhopper will complete its development on the weeds London rocket and kochia, confirming that these weeds are important hosts of the leafhopper. Evaluations of of site characteristics upon C. tenellus populations showed that nymph presence was found to be greater in fallow field type sites containing larger patches of weeds. The results of this research will provide New Mexico growers with critical information on the associations among the beet leafhopper, beet curly top virus, and key weed populations and the seasonal timing of these associations, providing management tools to better deal with this pest complex. Our data on the timing of leafhopper generations and developmental timing within generations and the relationship to plant phenology and host suitability are key to developing a management strategy. This combination of data give us a better starting point for managing the key weeds in the system and resulting leafhopper/virus populations. London rocket appears key to managing the system. Seedlings begin development in the fall and beet leafhoppers are ovipositing in late winter. Therefore, the weed should be targeted in fall while it still may be managed and before the leafhoppers have a change to build populations.

Our research on curly top virus focuses on the ecology, epidemiology and management of the disease caused by the virus in chile. We identified plant tolerance in peppers against curly top virus infection and developed tools to help characterize the nature of tolerance in tomatoes and peppers. Our research on fungal endophytes of locoweed has made progress toward characterization of endophytes from locoweeds throughout the western US. We concluded a study that assessed the effect of deleting a gene suscpected to be in the swainsonine catabolic pathway in Undifilum endophytes. Knockout of

saccharopine reductase caused increases in the levels of swainsonine and pipecolic acid, confirming the role of the enzyme in the pathway. 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. 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 fungus produces the toxin.

- 14 youth oriented activities resulted in 14,000 students gaining knowledge in plant, and animal protection.

- 97% of IPM trained producers recognize the importance of gained knowledge and how it directly impacts their homes and jobs.

- 750 Master Gardeners and garden club members felt 80% empowered to assess and treat their pest problems after attending educational IPM seminars.

- CEU trainings for New Mexico pesticide operators resulted in an economic impact of $25,330,000 million.

- 96% increase in knowledge among North-Central New Mexicans in insect identification after attending educational workshops.

- Integrated pest managements programs are being developed in Northern New Mexico to control and manage prairie dog and elk populations.

- 98% of 200 participants in the Master Gardener weed identification and management training program reported training courses changed and enriched their understanding of weed identification and management issues.

- 99% of participants in the New Mexico Master Gardener program indicated learning something new about IPM from educational presentations.

- 96 producers from 10 counties participated in pesticide resistance workshops; 86% reported learning something new from the presentations.

- Direct information/training on IPM practices resulted in decreased use of insecticide for cotton bollworm.

2. Brief description of the target audience

Attention will be given to commodity organizations in or serving New Mexico producers as well as pesticide applicators, Master Gardeners and garden clubs, youth (4H, Future Farmers of America and other groups and conferences) and the general public.

V(E). Planned Program (Outputs)

1. Standard output measures

2010	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Plan	0	0	0	0
Actual	0	0	0	0

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

Patent Applications Submitted

Year: 2010
Plan: 0
Actual: {No Data

Patents listed
{No Data Entered}

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2010	Extension	Research	Total
Plan	2	3	
Actual	2	3	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 **Target** **Actual**

2010	0	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	% producers adopting NMSU recommendations to protect plants and animals

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	Quantitative Target	Actual
2010	2	5

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Pathogens and Nematodes Affecting Plants
213	Weeds Affecting Plants
215	Biological Control of Pests Affecting Plants
216	Integrated Pest Management Systems
312	External Parasites and Pests of Animals
315	Animal Welfare/Well-Being and Protection

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	Quantitative Target	Actual
2010	3	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
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
312	External Parasites and Pests of Animals
315	Animal Welfare/Well-Being and Protection

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	Quantitative Target	Actual
2010	2	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
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
312	External Parasites and Pests of Animals
315	Animal Welfare/Well-Being and Protection

Outcome #4

1. Outcome Measures

% producers adopting NMSU recommendations to protect plants and animals

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	50	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
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
312	External Parasites and Pests of Animals
315	Animal Welfare/Well-Being and Protection

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

{No Data Entered}

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

1. Evaluation Studies Planned

- During (during program)
- Time series (multiple points before and after program)
- Case Study
- Comparisons between different groups of individuals or program participants experiencing different levels of progra intensity.
- Comparison between locales where the program operates and sites without program intervention

Evaluation Results

{No Data Entered}

Key Items of Evaluation

{No Data Entered}

V(A). Planned Program (Summary)

Program # 4

1. Name of the Planned Program

Plant Production

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
201	Plant Genome, Genetics, and Genetic Mechanisms	40%		40%	
202	Plant Genetic Resources	5%		5%	
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants	10%		10%	
204	Plant Product Quality and Utility (Preharvest)	15%		15%	
205	Plant Management Systems	30%		30%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

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

Year: 2010	Extension		Research	
	1862	1890	1862	1890
Plan	7.5	0.0	11.6	0.0
Actual	3.2	0.0	17.5	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	**1890 Extension**	**Hatch**	**Evans-Allen**
166863	0	309700	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
166863	0	309700	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 molecular characterization of 114 Valencia peanuts (78 accessions from US Valencia core and 35 accessions from global mini core and 1 control cultivar from ICRISAT) representing various geographical regions of the world was performed using microsatellite markers. Out of 100 primer pairs tested, 52 polymorphic primers amplified a total of 683 alleles. The number of alleles ranged from 2 to 28 per locus with a mean of 13.13 alleles per primer pair. Mean gene diversity and PIC value for all the alleles were 0.3496 and 0.2805, respectively. Based on Jaccard's coefficient of genetic similarity, accessions were clustered using unweighted pair group and the dendrogram was generated in the NTSYS-pc 2.20e. Two major clusters A and B sharing 30% similarity were obtained. Cluster A consisted of accessions predominantly from South American region. The cluster B consisted of an intermix of accessions from North America, South America, Africa, Asia and Caribbean regions. A single accession ICG6201 from the Caribbean region separated from rest of all the accessions and shared a similarity of only 10 %. Principal component analysis (PCA) depicted two major clusters with few accessions scattered apart in minor groups. In our study 41.18% of variation was explained by the first three PCs. The genetic diversity observed in Valencia core and global mini core could be used in breeding Valencia cultivars.

Evaluation of alternate oilseed, legume and forage crops as well as cropping systems continued in 2010. Adoptability of canola and sunflower to the region is better estabilished. A collaborative effort to develop winter hardy safflower varieties to tolerate heat and water stress of the region is in progress. Sorghum+legume intercropping system is being developed and fine tuned to help dairy industry in the region to produce high quality forage with less resources or more efficient use of resources. Wide spread adoption of this technology on the Southern High Plains will save significant water compared to growing forage corn. Effect of tillage and stubble management on soil and water conservation, nutrient use efficiency and water use efficiency is being evaluated in a multiyear study under rainfed conditions. Microclimate that can help dryland production system is also being monitored. Identifying water efficient biodiesel crops for the region and develop water use and yield relationships for them is the main focus of a number of water management projects. While a few projects have been completed multiple years of trials and reports are being prepared, a few projects are still continuing in the field. Trials focusing on effect of heat and water stress on crop productivity will continue on alternate crops.

Open-pollinated, male-sterile, maintainer, and pollinator breeding lines were screened for disease resistance, bolting resistance, bulb yield, bulb quality, maturity dates, and bulb color. Promising breeding lines and released cultivars were compared to commercial cultivars and experimental lines using variety trials. Hybrid lines were evaluated for disease resistance, bulb yield, and bulb quality. Three screening methods for developing FBR resistance were evaluated using progeny that resulted from this screening. Intermediate- and long day onion germplasms were screened from resistance/tolerance to IYSV.

Intermediate-day and long-day onion accessions, germplasm lines, and commercial cultivars were evaluated for IYSV and thrips tolerance using a field screening method. The field layout for the field screening included IYSV-infected bulbs as the inoculum source, IYSV-spreader plants to allow for the adequate spread of IYSV and onion thrips throughout the field, and test plots that included the germplasm being evaluated. Entries were evaluated throughout the growing season for leaf glossiness (glossy to waxy), leaf color (light green to blue), leaf axil pattern (very open to tight), number of onion thrips per plant, and IYSV severity and incidence. Entries differed in many of these characters. Several entries exhibited fewer IYSV symptoms. In some instances, this reduction in symptom expression was associated with leaf glossiness and color. Bulbs, that exhibited fewer IYSV symptoms, were selected from certain entries. These bulbs were placed in a seed production field in order to self-pollinate each bulb so that progeny, that may possess improved IYSV tolerance, may be generated.

New Mexico is a small cotton production state with many small cotton farms which are still growing

saved Acala 1517 seed in 2010. However, the acreage of Acala 1517 was not officially collected. Approximately 20,000 pounds of Acala 1517-08 seed were produced for the cotton growers in 2011. Based on recent information from seed companies, Acala cotton germplasm lines released recently from the program have been used by the private industry to have developed some very promising lines. These lines are expected to be released by seed companies for commercialization. Numerous cotton germplasm lines were evaluated for Verticillium wilt, drought and salt tolerance. This resulted in resistant/tolerant germplasm identified, laying a foundation for breeding, genetic, and genomic studies. We have developed a number of elite germplasm lines with desired fiber quality and high yield potential from interspecific breeding. This represents one of the first successful examples in cotton breeding in a century long attempt to significantly increase crop yield from interspecific hybridizations by introducing genes from one species to another. The Acala 1517 germplasm will continue to make substantial contributions to cotton breeding and industry in the U.S. A new marker system called miRNA-AFLP was reported from the program, which will provide a means to profile sequence variations in miRNA gene regions and to study their associations with agronomic traits. Several mitochondrial candidate genes associated with cytoplamic male sterility (CMS) were identified and reported for the first time in cotton. This represents the first work in investigating the molecular mechanism of CMS in cotton. Many drought and salt responsive genes have been identified and confirmed for the first time in cotton, which will provide a base for identifying genes responsible for abiotic stress tolerance and for developing candidate gene markers for stress tolerance breeding in cotton.

As a baseline study, we evaluated residues of twelve common rotational crops for southern New Mexico for their allelopathic impacts on chile. For example, sorghum residue at the lowest concentration (50mg/198ml water) caused a complete inhibition of both germination and radicle elongation in chile. These findings provide evidence that rotational crops can affect subsequent vegetable crops, and may impact cropping system decisions. The full results were presented at the International Pepper Conference hosted by NMSU and the Chile Pepper Institute in the fall of 2010 .

To capitalize on allelopathic and bioactive rotational crops, a preliminary cover crop study was conducted on weed management in onions. The results showed a marked reduction in weed pressure associated with fall-sown biofumigant species, specifically mustards and grasses. The six treatments included: a weeded control, a weedy control, hairy vetch, 'Ida Gold' mustard, winter rye, and a hairy vetch/winter rye combination. The three cover crop species had similar biomass production, which is important for direct weed competition. For direct dicot weed control, 'Ida Gold', winter rye, and the rye/vetch combination were quite effective (93% reduction in weed pressure). However, hairy vetch alone was not. Monocot weeds were completely excluded (100% reduction) from the winter rye and hairy vetch/rye combination. These results will be used as a basis for further studies into the rest of the growing season.

For comparison of bioactive cover crops to "standard" soil-borne pest management tools, we evaluated traditional chemical soil fumigants. Although results are inconsistent, vegetable growers report that the adoption of chemical soil fumigants such as metam potassium (KPAM) and chloropicrin help to manage yield loss by up to 20%. These studies have shown similar yield differences, probably due to suppression of sub-lethal levels of soil-borne pests.

The results of turfgrass studies indicated that medium to high rates of phosphorus (4-6 lbs of P per 1000ft^2 per year, or 190-290 kg P per ha) are required to ensure adequate establishment of most of these alternative turfgrass species. There was no nitrogen effect or nitrogen by phosphorus interaction. This indicates that phosphorus should be applied to these various grass species at the time of seeding to improve the resulting turfgrass stand when grown in native NM soils.

Commercialization of the drought tolerant alfalfa cultivar, NuMex Bill Melton, will ensure that farmers in the southwestern U.S. can benefit from its yield stability in both well-watered and water-limited environments. Evidence indicates that alfalfa populations which are most productive under deficit flood

irrigation management likely develop extensive root systems. Such populations appear to be able to more thoroughly explore the soil profile for available moisture to support shoot growth over longer periods of time. The identification of NPGS populations that perform well under limited and optimum soil moisture will provide additional germplasm to use for developing cultivars with greater yield stability. Our results specifically indicate that populations from Uzbekistan and Peru are particularly useful for improving alfalfa drought tolerance in irrigated western U.S. environments. Private industry continues to express interest in developing hybrids with NPGS accessions which perform well in our study environment. Such actions will facilitate the introgression of NPGS materials into commercial populations. The integration of DNA marker linkage data with field performance of genetically defined alfalfa research population families under varying soil moisture conditions has identified regions of alfalfa chromosomes that influence shoot and root biomass production under drought stress. DNA marker assisted selection programs are in progress to transfer such markers into elite cultivars to evaluate their impact on cultivar productivity in water-limited environments.

The New Mexico Recombinant Inbred Lines (NMRILs) are having a significant impact on studies of the C. annuum/P. capsici interaction. Currently, the NMRILs are the standard for race differentiation in the world. Furthermore, this project has established that the different disease syndromes are inherited independently, leading to greater complexity in host/pathogen interactions making breeding for resistance more difficult. This host/pathogen interaction is becoming a model for studying the functional aspects of disease resistance to two very different disease syndromes, root rot and foliar blight. The results from these studies will give insight into host resistance and lead to a better understanding of the mechanisms underlying durable resistance.

When surveyed, 98% of the 158 participants of the 2010 Master Gardener program in New Mexico considered training in turfgrass maintenance important.

All participants of the 2010 Turfgrass Irrigation Workshop in Bernalillo County reported that the information presented at the workshop will help them make better irrigation decisions and will also help them conserve irrigation water.

Participants' knowledge of understanding of turf irrigation increased significantly as a result of the workshop. Attendees rated their knowledge about irrigation requirements and irrigation water quality at an average of 2.1 before and 3.2 after (1 = poor to 4 = excellent) the workshop.

95% of the participants reported that training changed and enriched their understanding of water requirement and water quality to either a great extent or to a fair extent (immediately following a 3 hour training program).

Of all 67 participants that have attended 3 or more years in the Master Gardener Program, 80% reported that repeated training changed and enriched their understanding of turfgrass irrigation differently than one time training would have and 95% admitted that repeated training changed their attitude towards turfgrass.

- Pesticide Applicators Trainings in 3 of 13 Northern counties resulted in 63 licensed CEU's.

- 142 producers gained knowledge on soil water efficiency, irrigation basics, drought mitigation strategies, weed identification and control, herbicide usage, forage insects, and the overall productive capability and economic value of their particular crop through educational seminars.

- Master Gardeners contributed 10,400+ hours of service in Northern Extension district, valued at $156,000.

- 410 Northern New Mexicans gained knowledge in Xeriscape techniques.

- 87% increase in knowledge of small acreage land owners in healthy land stewardship practices. 98% used the information they gained on their respective places.

- 2 of 11 Eastern district counties increased knowledge in wheat production practices through demonstration plots and educational workshops.

- Pesticide Applicators Trainings in 6 of 11 Eastern counties resulted in 267 licensed CEU's.

- 39 pistachio growers gained knowledge on growing techniques and Naval Orangeworm control. 97% said the workshop increased or enhanced their knowledge and 97% said they expected to use the information presented in their pistachio orchards.

2. Brief description of the target audience

The target audience is both small as well as medium and large scale agricultural operations, businesses, associations, cooperatives, consulting firms and collectives that may or may not be defined as a farm under the USDA economic return criteria, but rather are land owners, managers, consultants, or students that wish to improve agronomic production and efficiency as do and are other audience participants such as Extension agents, farmers, ranchers, other agricultural specialists, private-tribal-state-federal and even nonprofit organizations.

V(E). Planned Program (Outputs)

1. Standard output measures

2010	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Plan	0	0	0	0
Actual	0	0	0	0

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

Patent Applications Submitted

Year: 2010
Plan: 0
Actual: {No Data

Patents listed
{No Data Entered}

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2010	Extension	Research	Total
Plan	2	3	
Actual	2	3	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	Target	Actual
2010	0	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 producers, growers, homeowners adopting NMSU recommendations
5	# of improved plant varieties released

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	Quantitative Target	Actual
2010	3	6

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

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	Quantitative Target	Actual
2010	3	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

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	Quantitative Target	Actual
2010	2	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

Outcome #4

1. Outcome Measures

% of producers, growers, homeowners adopting NMSU recommendations

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	60	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
205	Plant Management Systems

Outcome #5

1. Outcome Measures

# of improved plant varieties released

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	1	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)

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

{No Data Entered}

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

1. Evaluation Studies Planned

- During (during program)
- Case Study
- Comparisons between program participants (individuals, group, organizations) and non-participants
- Comparisons between different groups of individuals or program participants experiencing different levels of progra intensity.
- Comparison between locales where the program operates and sites without program intervention

Evaluation Results

{No Data Entered}

Key Items of Evaluation

{No Data Entered}

V(A). Planned Program (Summary)

Program # 5

1. Name of the Planned Program

4-H and Youth Development

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 professional FTE/SYs expended this Program

Year: 2010	Extension		Research	
	1862	1890	1862	1890
Plan	5.5	0.0	0.3	0.0
Actual	6.0	0.0	1.2	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	**1890 Extension**	**Hatch**	**Evans-Allen**
139053	0	18961	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
139053	0	18961	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

Research extends research on the learning impacts of integrating science and agriculture in the secondary curriculum into middle schools. The MMSAEEC also has a youth leadership development component arising from the students' involvement in experiential team learning activities like working in research teams that must be assessed. 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 MMSAEEC's impacts on basic and agricultural and natural resource sciences 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.

- 51% increase in volunteer leader enrollment in Northern New Mexico.
- 76% of New Mexico counties trained volunteers in programs that impacted 52,000 youth.
- 15% of adult 4-H volunteers participated in at least one educational program.
- 5,397 adults volunteered time and efforts to the New Mexico 4-H Youth Development Program.
- 68,929 youth engaged in educational programs provided by the New Mexico Cooperative Extension Service 4-H Youth Development Program.
- Over 17,400 hours of community service were provided by 5,800 youth.
- 92% of local clubs conducted community service projects.
- 75% of youth increased public speaking and communication skills through demonstrations and leadership roles in their local club.
- 4,225 New Mexico urban youth gained information about the importance of agriculture in today's society through Kids & Kows.
- 2,000 elementary school students learned the importance of hand washing, refrigerating foods, washing fruits and vegetables and keeping counters clean.
- 2,000+ students in Eastern New Mexico gained awareness of the potential dangers connected with agriculture.

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.

V(E). Planned Program (Outputs)

1. Standard output measures

2010	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Plan	0	0	0	0
Actual	0	0	0	0

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

Patent Applications Submitted

Year: 2010
Plan: 0
Actual: {No Data

Patents listed
{No Data Entered}

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2010	Extension	Research	Total
Plan	2	1	
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	Target	Actual
2010	0	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	Quantitative Target	Actual
2010	1	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

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	Quantitative Target	Actual
2010	2	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

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	Quantitative Target	Actual

2010	50	2114

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The goal of 4-H is to help young people develop as individuals and as responsible and productive citizens in their communities. Adult volunteers who spend time with 4-H members are key in this process.

What has been done
We had reported to us that 5,397 leaders volunteered time to the 4-H program. Assuming that volunteers averaged 8 hours for each volunteer gives a total of 43,179 volunteer hours.

Results
Volunteer leaders have gained knowledge and skills on effective club meetings, positive youth development, 4-H projects, exhibits, leadership roles, delegation, teaching methods, strengthening programs, shooting sports, contest training, record books, working in special interest and school enrichment delivery modes, and new leader orientation topics.

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 and Data Collection)

1. Evaluation Studies Planned

- Before-After (before and after program)
- During (during program)
- Time series (multiple points before and after program)
- Comparisons between program participants (individuals, group, organizations) and non-participants
- Comparisons between different groups of individuals or program participants experiencing different levels of progra intensity.

- Comparison between locales where the program operates and sites without program intervention

Evaluation Results

{No Data Entered}

Key Items of Evaluation

{No Data Entered}

V(A). Planned Program (Summary)

Program # 6

1. Name of the Planned Program

Agricultural Markets, Trade, and Economic/Business Development

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 professional FTE/SYs expended this Program

Year: 2010	Extension		Research	
	1862	1890	1862	1890
Plan	4.9	0.0	7.0	0.0
Actual	4.5	0.0	5.9	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**
118195	0	0	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
118195	0	0	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

We have developed water use estimates for pecans, cotton, and alfalfa in New Mexico's Lower Rio Grande Valley. Relationships between crop water use and crop yield have been developed for pecans in the region. The economic cost of deficit irrigation in pecans has been quantified. In Albuquerque's South Valley community we have identified and quantified socio-economic and technical parameters which affect agricultural productivity and agricultural water use in peri-urban, small, scale, multicultural, traditional agriculture. These technical engineering and hydrologic results are being used develop technologies and guidelines which will enhance the profitability and sustainability of small-scale farms. We have documented the Albuquerque-area consumer preferences with respect to local and organic produce. We are estimating the value of food and agricultural commodities produced in the region (but not necessarily sold commercially), estimating the economic impact of agricultural production, and identifying and documenting BMPs for irrigated agriculture in New Mexico's South Valley. We have developed a database of public land ranches in southwestern New Mexico that includes information about various socio-economic characteristics of the ranches, including rates of ownership turnover and the impact of these characteristics on ranch management. These data are being combined with ecological data to examine the linkages between socio-economic and ecological processes on western U.S. rangelands. Results of this research will assist water resource and rangeland managers and stake-holders in planning, management, and policymaking in the future.

Industry participants are changing their behavior and are exploring new opportunities. Some industry participants are taking information provided by this project's research and examining opportunities to use similar strategies in their own industries. Prompted by exposure to publications and presentations regarding new marketing opportunities, participants in a number of industries are examining opportunities of developing and expanding new markets. Specifically, participants are interested in value-added production possibilities as well as opportunities to regionally brand products grown, raised, and/or processed in New Mexico.

The important finding of the soil moisture study was that there is potential to improve prediction and estimation of the annual variation in forage yields on rangeland by using soil moisture probes and soil moisture models instead of the traditionally considered summaries of annual precipitation amounts. This is

important for evaluating alternative management strategies for adjusting to drought and potential changes in climate. It is anticipated that in the future soil moisture measurements will be incorporated into research about the effect of climate on livestock production strategies and management alternatives.

50 producers/business owners and their employees in Eastern New Mexico participated in a series of customer service trainings based on FISH curriculum to improve work habits, attitudes and gain knowledge of local tourism.

2. Brief description of the target audience

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

V(E). Planned Program (Outputs)

1. Standard output measures

2010	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Plan	0	0	0	0
Actual	0	0	0	0

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

Patent Applications Submitted

Year: 2010
Plan: 0
Actual: {No Data

Patents listed
{No Data Entered}

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2010	Extension	Research	Total
Plan	2	2	
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	Target	Actual
2010	0	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	Quantitative Target	Actual
2010	2	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
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	Quantitative Target	Actual
2010	2	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
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

{No Data Entered}

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

1. Evaluation Studies Planned

- Before-After (before and after program)
- During (during program)
- Time series (multiple points before and after program)
- Case Study
- Comparisons between program participants (individuals, group, organizations) and non-participants
- Comparisons between different groups of individuals or program participants experiencing different levels of progra intensity.
- Comparison between locales where the program operates and sites without program intervention

Evaluation Results

{No Data Entered}

Key Items of Evaluation

{No Data Entered}

V(A). Planned Program (Summary)

Program # 7

1. Name of the Planned Program

Health and Wellbeing

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 professional FTE/SYs expended this Program

Year: 2010	Extension		Research	
	1862	1890	1862	1890
Plan	7.0	0.0	1.1	0.0
Actual	6.0	0.0	2.5	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	**1890 Extension**	**Hatch**	**Evans-Allen**
361537	0	37923	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
361537	0	37923	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

During the FY 2010 window, more than 11,000 children and 2,000 adults completed four or more lessons on healthier eating on a limited budget. We are now able to show that programming is resulting in improvement of knowledge and practices. The activities of this project make children and their parents aware of the caloric impacts of foods. The project also informs families of alternatives for high fat, high simple sugar snacks.

The validity and, in fifth grade students, reliability of the survey instrument used by the Cooperative Extension Service for its school based nutrition and fitness intervention programs was established. This will strengthen and enhance the reporting data. The effectiveness of nutrition and fitness programs in New Mexico public schools will be measured. 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.

Over 600 people have been served under the Healthy Relationships effort. Nearly 400 fathers have been served in the responsible fatherhood initiative. The number of children reached under these initiatives is over 1300. The number of depth of extended family members who have benefited from these programs is immeasurable.

36 parenting class series (each lasting 4 months) were offered for teen parents, single parents, grandparents raising grandchildren, families involved with the criminal justice system, and families dealing with substance abuse in 6 counties in New Mexico. 450 parents and 456 children participated. In addition, 6 class series were offered to incarcerated fathers in Doña Ana County. 148 fathers and 388 children participated. Parents showed significant improvements on all assessment tools. They had significant increases in empathy for children's needs, and knowledge of effective discipline techniques. They showed significant decreases in belief and use of corporal punishment, reversal of parent-child roles, and inappropriate expectations of children. We achieved a 70% retention rate in the classes and found no significant differences between those who completed and those who dropped out.This research has added to the body of knowledge about the positive effects of parenting education. Much of the earlier research focused on white, middle-class mothers. The current research was conducted with Hispanic, low-income families including both mothers and fathers.

- 10,551 New Mexico Youth participated in school based nutritional programs (Organ Wise Guys, KidsCan and Just be it!) that promote science based nutrition decisions and physical activity. 95 % of students have shown knowledge increase in nutrition, implementing of healthy choices and the food

pyramid.

• Approximately 16,160 New Mexicans have been impacted by the Extension ICAN (Ideas for Cooking and Nutrition) program. Impacts include healthier life-style choices that promote healthy life long eating habits and the reduction of chronic disease later in life.

• 48 Kitchen Creations cooking schools (approximately 17,500 participants) were held in 23 counties, 3 were taught in Spanish and 6 held in Native American communities. 78% of Kitchen Creations participants indicated they understand the strategies necessary to plan and prepare healthy meals while 100% of participants stated Kitchen Creations helped them manage their diabetes.

• 47,597 New Mexico residents received Baby's First Wish newsletter.

• 150 parents graduated from parenting programs held across the state. 95-100% of participants indicated increased knowledge in behavior management, child development, food allergies, financial assistance, discipline, child abuse and neglect, and food safety.

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.

V(E). Planned Program (Outputs)

1. Standard output measures

2010	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Plan	0	0	0	0
Actual	0	0	0	0

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

Patent Applications Submitted

Year: 2010
Plan: 0
Actual: {No Data

Patents listed
{No Data Entered}

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2010	Extension	Research	Total
Plan	3	1	
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	Target	Actual
2010	0	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	Quantitative Target	Actual
2010	1	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 #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	Quantitative Target	Actual
2010	3	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
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	Quantitative Target	Actual
2010	2	20

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 #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	Quantitative Target	Actual
2010	70	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 and Data Collection)

1. Evaluation Studies Planned

- Before-After (before and after program)
- During (during program)
- Time series (multiple points before and after program)
- Case Study
- Comparisons between program participants (individuals, group, organizations) and non-participants
- Comparisons between different groups of individuals or program participants experiencing different levels of progra intensity.
- Comparison between locales where the program operates and sites without program intervention

Evaluation Results

{No Data Entered}

Key Items of Evaluation

{No Data Entered}

V(A). Planned Program (Summary)

Program # 8

1. Name of the Planned Program

Sustainable Management of Natural Resources

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	10%		10%	
103	Management of Saline and Sodic Soils and Salinity	5%		5%	
121	Management of Range Resources	20%		20%	
123	Management and Sustainability of Forest Resources	10%		10%	
124	Urban Forestry	5%		5%	
135	Aquatic and Terrestrial Wildlife	10%		10%	
136	Conservation of Biological Diversity	5%		5%	
403	Waste Disposal, Recycling, and Reuse	10%		10%	
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 professional FTE/SYs expended this Program

Year: 2010	Extension		Research	
	1862	1890	1862	1890
Plan	7.3	0.0	14.3	0.0
Actual	8.3	0.0	18.9	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**
653548	0	726848	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
653548	0	726848	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

Intensive studies on the Pueblo of Acoma, indicate a nonmigratory population of elk, however, elk were distributed across a mosaic of adjacent private and public jurisdictions which require collaborative harvest policy development with neighboring properties. Female home range areas were from 85.7-113 km² in summer and spring. Average male home range areas ranged from 64-245 km² during winter and fall. Calving home range size ranged from 14-41 km². Habitat composition analysis indicated male and female elk select Pinyon-Juniper woodland annaully and during most seasons. Landscape scale thinning or removal of dense Pinyon-Juniper woodland to reduce risk of catastrophic fire, create habitat heterogeneity, and enhance forage availability is recommended.

Work on risk assessment for invasive species and other population-level risk assessmentshas helped the broader risk analysis/policy analysis community to understand the applicability of the regional and ecological risk assessment paradigms to environmental stressors other than chemical contaminants, and has begun to make ecologists and conservation biologists aware of how those paradigms provide an effective way to link science and policy. According to Web of Science, publications resulting from this project are cited an average of 9.43 times, with an h-index of 6.

As a result of research, we will be better able to sustainably manage our native vertebrate fauna and desert and plains grasslands. These 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 effect 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.

Research is pertinent to the conservation and sustainable use of our 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 effects of climate change with respect to carnivore populations across North America will provide federal and state resource agencies with information necessary to plan future conservation efforts and identify lands important for purchase. This work, which also involves an analysis of habitat use across our border with Mexico, will shed light on how a border fence will influence connectivity of extant populations. Finally, our work examining how climate change is expected to influence the demography and distribution of species is valuable for building a wealth of evidence to convince the public and policy makers that we are having a major impact on our Earth.

A study has begun to elucidate the reproductive mode of the three presumed species. Triops longicaudatus "long" is thought to be gonochoric with separate sexes is approximately equal abundance in a population. Triops longicaudatus "short" is composed of either parthenogenetic females or hermaphrodites with no apparent males. Triops newberryi populations typically have a low percentage of "males" with the remainder of the population composed of either parthenogenetic females or hermaphrodites. With genetic analysis of the various reproductive forms, we expect to discern the reproductive modes. For example, if T. longicaudatus "short" is selfing hermaphrodite or automictic parthenogen, then it should have very little heterozygous individuals relative to T. newberryi which may have some fraction of outcrossing, and both of these species should have lower frequencies of heterozygotes than T. longicaudatus "long". A study has been initiated using 6 multiplexed microsatellites to genotype 50 individual "females" (or hermaphrodites) of T. longicaudatus "short" and T. newberryi. From these genotyped individuals, we will select a set of homozygous and heterozygous "females" and genotype 20-50 individual encysted embryos from each mother. Results of this study should enable identification of the apparent reproductive modes including apomictic parthenogenesis, automictic parthenogenesis (four different modes), selfing hermaphroditism, and selfing hermaphroditism with some outcrossing.

Assessment of climate change legislation impacts on New Mexico agriculture reveal that the agricultural economy will face likely be challenged by associated rises in energy costs though the negative impacts will be mitigated by increased revenues from rising commodity prices.

We determined tree canopy cover (TCC) and monitored cattle use of Pinyon-juniper (PJ) woodland during spring in a 146ha pasture at a site in central New Mexico. Half the research pasture had been cleared of PJ woodland in the 1980s. A subset of intact woodland grid cells containing cow locations (approximately 62% of these occurred in wooded areas) was used to describe the relationship between cattle spatial distribution and PJ canopy cover. We found a significant negative exponential relationship between TCC and relative use of grid cells by cattle. Tree cover explained 50.1% of the variation in relative use by cattle of the 1 ha woodland grid cells. Most cow positions recorded in PJ-dominated areas occurred in grid cells with 30-50% TCC. A sharp decline in woodland use occurred beyond an apparent threshold of 55% TCC. Our data suggest that PJ woodlands with up to 50% canopy cover could provide an adequate balance of shelter and forage for cattle during spring at our site. We investigated the relationships between stress coping styles, patterns of rangeland use, and performance of thirty six 3-year-old cows during two consecutive calving season (2006-07). We used Cluster Analysis and Discriminant Function Analysis to classify cows into two stress copying style groups on the basis of multiple behavioral traits. Compared to proactive cows (PR), reactive individuals (RE) tended to spend more time at water, explore smaller areas, and exhibit more concentrated search patterns. Reactive individuals also had lighter body weights, and weaned lighter calves. Cow-calf location relations measured in 2007 suggested that calves born to highly proactive cows (PR+) were lighter than their peers born to less proactive mothers (PR-). PR+ cows tended to spend less time near their calves and to travel further from their offspring and therefore tended to wean lighter calves than PR- mothers. Behavioral syndromes appeared to influence landscape use patterns and productivity of cattle in this study. Cows with intermediate stress coping styles (as defined in this study) appeared to be the best suited to the biophysical characteristics of our study site. Plots on rangeland infested with one-seed juniper were exposed to high (small patches; 10m2/AU/day) or low (large patches; 60 m2/AU/day) density stocking (vs control plots without grazing) of goats and goats plus sheep (2 replicates/treatment) during a summer targeted grazing experiment. Both deer (SI: 0.00) and cattle (SI: 0.40; $P < 0.001$) avoided large patches which had been grazed by goats + sheep. These patches received heaviest utilization of herbaceous vegetation (73.5%) the previous summer. Deer selected small patches that had been grazed by goats + sheep whereas cattle selected large patches and avoided small patches grazed by goats alone . Cattle exhibited greatest preference for grazed patches in summer, while deer avoided grazed patches in summer. The probability of mule deer presence on a given patch (y) was reduced by cattle (x) presence. Targeted grazing programs with small ruminants could be used to create contrasting patches of different sizes to improve habitat for multiple rangeland ungulates.

Ranchers should try to acquire cattle from rangeland and environmental conditions similar to those in their operation when restocking after drought. Compared to naïve animals, experienced animals may use almost two times larger area. When grazing extensive and rugged rangeland pastures, naïve cattle require time to become accustomed to novel pastures and vegetation. After time, naïve cattle begin to learn to forage more effectively, but still do not utilize the rangeland as efficiently as native cattle.

Brahman cattle are adapted to hot and dry environments and are able to walk farther each day than Brangus or Angus cattle. Although they walk farther each day, Brahman cattle do not use areas that are farther from water than Brangus or Angus. In addition, Brahman cattle appear to avoid areas that contain mountainous terrain, while Brangus and Angus cattle readily use rugged rangeland. Brangus are an excellent choice for grazing in the Chihuahuan Desert rangeland

Vegetation surveys in the 4 study pastures for herbage production and plant cover were completed in October of 2010. All 4 pastures were stocked with cattle in March 2006. Cattle weights and calf crop information were collected periodically in 2006, 2007, 2008, 2009, and 2010. 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. Grazing use has averaged 29% in lightly stocked pastures and 40% 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.

Investigations on desert soils have broad impacts because desert soils are vast and fragile. Desert soils cover about one-third of the Earth's land surface, so perturbations and management strategies will have major implications for carbon storage or emissions. Desert soils--especially sandy soils--are major sources of dust. If vegetative cover is disturbed a series of feedbacks begin to cascade causing drastic changes in vegetation, which in turn lead to changes in the entire ecosystem.

Total ET amounted to 42.0 inches while total application plus rainfall was 43.1 inches for the poplar trees. Clone OP-367 remains the tallest clone; after nine seasons reaching a mean height of 63.1 feet. Significantly shorter than OP-367 were the clones 311-93, 58-280, 49-177, and 195-529, but these were significantly taller than the remaining three clones. OP-367 had the largest mean DBH at 10.6 inches. This was followed by 311-93 and 58-280 with DBH greater than 8 inches. Maximum wood volume was obtained by OP-367 at 5,968 ft3/acre. Total ET amounted to 42.6 inches while total application plus rainfall was 43.2 inches for the Biosolids application trial. In 2009, the 10-ton treatment led for all growth parameters, but only height (62.1 ft) was significant greater than the other treatments. This trial was established to investigate four irrigation treatments (70, 80, 120, and 130% of replacement ET) on four top-performing clones from other trials. Total ET (at 100% replacement) for the 2010 growing season was calculated at 42.3 inches for fourth year hybrid poplar. Actual application for the respective treatments was 29.5, 35.8, 44.5, and 49.7 inches or 99.7, 105.9, 87.6, and 90.4 percent of calculated applications at the four treatment rates,respectively. Clone 433 led for all growth parameters. Also, while there is significant interaction between clones and irrigation treatments, the 120% ET irrigation treatment produced the most growth on average. An established xeric adapted plant demonstration garden consisting of about 100

drought tolerant, mostly native plant species was maintained during 2010. The garden was split into four differentially irrigated sections in 2004 after establishing at least one individual of each species in each section. Drip irrigation treatments were weekly water application volumes required to replace 0, 20, 40, and 60% of reference ET adjusted with a mean plant canopy area. Plant quality, height, and actual canopy area were measured in all irrigation treatments and preliminary crop coefficients were formulated. Most plants survived and exhibited acceptable quality when irrigated at canopy-corrected KC levels of between 0.2 and 0.4. An overall KC of 0.3, adjusted with canopy area, is suggested for scheduling irrigations on mixed-species xeriscapes in the Intermountain West. One water conserving measure receiving increased attention throughout the western U.S. is the use of catchment systems that collect and store precipitation runoff from roofs or other hard surfaces. If late summer water shortages occur because of accelerated snow melt as predicted by the climate models, the ability to store and use rainwater for irrigating could help mitigate the adverse effects of these shortages on plant growth and yields during a critical time of fruit set and development. Choosing suitable drip components that function adequately under these low heads (typically less than 10 feet or 4 psi) is problematic. PARTICIPANTS: Nothing significant to report during this reporting period.

A web interface allows residents to estimate their monthly or yearly water budget based on their vegetation type, landscaped area, or landscape species composition. Residents also can view aerial images (0.5 foot resolution) of their parcel property and digitize water consumptive landscape features which are subsequently used to estimate water budgets. Water budget calculator inputs include, plant coefficients (Kc's) for shrubs, trees and turf. Length of growing season, annual temperature and growing degree days were used to transfer landscape plants Kc's from California landscape irrigation guide and Farmington, New Mexico. Monthly and yearly historical evapotranspiration values were calculated. In addition, historical reference evapotranspiration values for El Niño, La Niñaand Neutral year are available and allow water budget to be modified based on the signal. This web interface will be an efficient tool to conserve landscape irrigation water, match different landscape categories with their water requirements, and it satisfies homeowners requirements in knowing their landscape water requirements. In addition, the interface offers different tools to satisfy residents and knowledgeable landscapers' accuracy levels of estimating landscape water requirements.

Progress has been made on developing effective propagation protocols for many native woody plant species which can be used in disturbed land or riparian restoration/ rehabilitation. On-going studies on several species of woody shrubs/trees are progressing. Specifically, work on overcoming seed and seed coat dormancy mechanisms in two native elderberry (Sambucas) species is beginning to yield results. Also, seed treatments of Cercocarpus ledifolious are on-going but generating less informative results. A pilot study relating the dormancy level, as measured by days to bud burst, on the ability of Symphorocarpus orientalis cuttings to root was conducted. The results of this pilot indicate a potential for successful rooting earlier in the dormant period than previously observed. Work, including securing extramural funding, was conducted on establishing a new transplanting trial for high elevation disturbed sites. The previous main focal point of this research, examiningin situ root system development over time using two approaches; a modified grow bag system for destructive analysis and an in situ rhizotron was abandon. A novel study building on early work on Robinia neomexicana seed scarification, was initiated. This project will look at the influence of seed scarification treatment on the ability to improve hydroseeding of this species. Use of Robinia neomexicana in such direct seeding operations was unsuccessful as previous scarification treatments left the seed coat softened and vulnerable to the physical pressures associated with the hydroseeding process. The work being proposed is based on earlier work on using an "impacting" process to overcome seed coat barriers to germination. Actual field trials of this work will begin in May of 2011. The progress on a ponderosa pine progeny test contrasting warm-dry conditions and more traditional planting sites included identifying seed lots within our seed inventory (67 sources from within New Mexico) as well as obtaining sources from other areas with the species range. Three progeny/provenance studies have been designed. The project sites identified in 2008, south central New Mexico and in north central New Mexico were chosen to based on the two sites ability to provide a testing

environment that emulates predicted changes in climate where ponderosa pine currently exists, specifically this is a lower elevation warm, dry site relative to much of this species current distribution in New Mexico and a more traditional site. The first progeny test will evaluate the baseline selection method used to identify superior trees in the field. The second evaluation will be region wide provenance test. This test will emphasize sources collected in New Mexico but also include sources from Arizona, Colorado, Utah, South Dakota and Montana. The third trial will be a trial comparing the progeny collected from trees in the original 1982 progeny test housed at the Mora Research Center with the parent trees.

Most of the larger pecan orchards in the Mesilla Valley with their own wood chippers are now chipping their pecan pruning wastes instead of burning. Many smaller farmers contract the chipping of their pecan wastes. Thus, burning of pecan pruning wastes has been drastically reduced which has reduced smoke and improved air quality in the Mesilla Valley. Research has clearly demonstrated that chipped pruning wastes can be incorporated into orchard soils without fear of nitrogen immobilization as long as the chips are large and unusually high amounts are not applied. Additional nitrogen fertilizer is not needed when incorporating wood chips.

The phytoremediation of uranium waste or uranium contaminated soil can be enhanced with the use of proper soil amendments. Citrate increases plant uptake of uranium, but manure decreases plant uranium uptake. Kochia appears to be a good choice for a plant that can phytoremediate uranium waste or uranium contaminated soil and can be agronomically grown.

Chile pepper germination and growth response to salinity was measured and reported at the annual Chile Pepper Conference in Las Cruces, NM. A paper was published (Niu et al., 2010) that reported chile pepper responses to salinity under field conditions. We are currently revising a manuscript describing greenhouse experiments that evaluated the response of several chile pepper varieties to salinity during germination, emergence and stand establishment.

Arsenic sorption by NM soils and calcium carbonate in the presence of wastewater effluent was evaluated in the lab and reported in a PhD dissertation (Nemmers, 2010) and MS thesis (Campos-Diaz, 2010). When wastewater effluent is present as in a municipal land application area, arsenic will tend to be more mobile through the soil than previously thought. Our testing of several plant species for their ability to accumulate uranium indicated that soluble uranium forms (e.g., uranyl nitrate) were more likely to be extracted from soil than schoepite or less soluble, weathered forms of uranium. Potential candidates for uranium extraction and phytoaccumulation that bear closer scrutiny include Desert marigold (Baileya multiradiata), Sacred Datura (Datura metaloides) and Coyote or Buffalo Gourd (Cucurbita palmate).

Water is a limited resource for crop production in arid and semi-arid areas. The purposes of this study were to estimate the amount and depth of water and nitrate-nitrogen (NO_3-N) fronts below the rooting zone for two onion (Allium cepa L.) fields under furrow and drip irrigation systems located in the Mesilla Valley of Southern New Mexico and determine how the current best management could be improved. Soil samples were collected during the last week of each month throughout the growing season from both fields. Soil samples were analyzed for NO_3-N and chloride concentration. The total amounts of N fertilizer applied to furrow and drip irrigated fields were 383 and 292 kg ha^{-1}, and total water applied was 95 cm and 81 cm, respectively.The amount of NO_3-N in the soil water estimated by chloride tracer technique was 165.9 ±0.97 mg L^{-1} (Mean ±SE) for furrow and 66.8 ±4.45 mg L^{-1} for drip irrigated fields for the 60-200 cm depth. The NO_3-N loadings below the rooting zone were 240 ±2.6 kg ha^{-1} for furrow and 79 ±6.9 kg ha^{-1} for drip irrigated fields. A leaching fraction of 0.20 ±0.006 was obtained from the furrow and 0.17 ±0.02 from drip irrigated field. The irrigation efficiencies were 80 ±0.60% and 83 ±2.0% and wet onion yields (moisture content 90%) were 45120 kg ha^{-1} and 50980 kg ha^{-1} for the furrow and drip irrigated fields, respectively. Project results demonstrate that about 11% of water is lost due to vapor flow. Therefore measures should be undertaken to control evaporation for conserving water. Small and delayed N fertilizer application until onion bulbing starts, frequent applications of fertilizer and water preferably through drip irrigation are recommended to reduce deep percolation and increase nitrogen and water use efficiencies.

A comprehensive, two-phase environmental impact assessment of four years of land application of salt-affected, treated industrial wastewater to a Chihuahuan Desert shrubland has been completed. In the first phase of influent and effluent water quality and soil compositional changes, land application increased soil N, P, and K fertility and increased the soil stress factors of pH, salinity, and sodicity. Twenty-seven tons of ionic land deposits--comprised mainly of sodium, chloride, and calcium carbonate equivalent alkalinity-- were recorded. In the second assessment phase of vegetation impacts, an additional two tons of combined vegetation biomass had accumulated on an irrigated (land application) plot as compared with an adjacent non-irrigated plot. Throughout four years of land application, there was no harm to the perennial shrub vegetation, although there was a significant change in intershrub space herbaceous species composition as the soil became increasingly sodic.

• 7,200 New Mexico residents increased their understanding of the role of trees in landscape and water harvesting practices. 60% of residents increased their knowledge by 73%.

• An increase in understanding of water conservation practices for farmers by 90% and a significant increase in the number of New Mexico producers implementing these practices resulted in a savings of $30million ($175 million if counting livestock of these crops).

• $1,500,000 in additional fire fighting equipment and wildfire education in Eastern NM have decreased range fires by 55%.

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 ofparks, forests, and waters.

V(E). Planned Program (Outputs)

1. Standard output measures

2010	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Plan	0	0	0	0
Actual	0	0	0	0

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

Year: 2010
Plan: 0
Actual: {No Data

Patents listed
{No Data Entered}

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2010	Extension	Research	Total
Plan	3	5	
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	Target	Actual
2010	0	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	Quantitative Target	Actual
2010	3	18

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 #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	Quantitative Target	Actual
2010	5	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 #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	Quantitative Target	Actual
2010	3	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 #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	Quantitative Target	Actual
2010	70	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

{No Data Entered}

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

1. Evaluation Studies Planned

- Retrospective (post program)
- Before-After (before and after program)
- During (during program)
- Time series (multiple points before and after program)
- Case Study
- Comparisons between program participants (individuals, group, organizations) and non-participants
- Comparisons between different groups of individuals or program participants experiencing different levels of progra intensity.
- Comparison between locales where the program operates and sites without program intervention

Evaluation Results

{No Data Entered}

Key Items of Evaluation

{No Data Entered}

V(A). Planned Program (Summary)

Program # 9

1. Name of the Planned Program

Global Food Security and Hunger

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
101	Appraisal of Soil Resources	0%		100%	
	Total	0%		100%	

V(C). Planned Program (Inputs)

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

Year: 2010	Extension		Research	
	1862	1890	1862	1890
Actual	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**
0	0	0	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
0	0	0	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

Activities for this area are listed under Animal Production, Plant Production, and Animal and Plant Protection sections.

2. Brief description of the target audience

See Animal Production, Plant Production, and Animal and Plant Protection sections.

V(E). Planned Program (Outputs)

1. Standard output measures

2010	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Plan	{NO DATA	{NO DATA	{NO DATA	{NO DATA
Actual	0	0	0	0

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

Patent Applications Submitted

Year: 2010

Plan:

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2010	Extension	Research	Total
Actual	0	0	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.
  Not reporting on this Output for this Annual Report

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Adoption of research recommendations.

Outcome #1

1. **Outcome Measures**

Adoption of research recommendations.

Not Reporting on this Outcome Measure

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

Activities for this area are listed under Animal Production, Plant Production, and Animal and Plant Protection sections.

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

1. Evaluation Studies Planned

Evaluation Results

{No Data Entered}

Key Items of Evaluation

{No Data Entered}

V(A). Planned Program (Summary)

Program # 10

1. Name of the Planned Program

Climate Change

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
101	Appraisal of Soil Resources	0%		50%	
132	Weather and Climate	0%		50%	
	Total	0%		100%	

V(C). Planned Program (Inputs)

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

Year: 2010	Extension		Research	
	1862	1890	1862	1890
Actual	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**
0	0	0	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
0	0	0	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

Activities for this area are listed under Sustainable Management of Natural Resources.

2. Brief description of the target audience

See Sustainable Management of Natural Resources.

V(E). Planned Program (Outputs)

1. Standard output measures

2010	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Plan	{NO DATA	{NO DATA	{NO DATA	{NO DATA
Actual	0	0	0	0

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

Patent Applications Submitted

Year: 2010

Plan:

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2010	Extension	Research	Total
Actual	0	0	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.
  Not reporting on this Output for this Annual Report

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	# of research articles published

Outcome #1

1. Outcome Measures

# of research articles published

Not Reporting on this Outcome Measure

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Appropriations changes
- Competing Public priorities

Brief Explanation

See Sustainable Management of Natural Resources.

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

1. Evaluation Studies Planned

Evaluation Results

{No Data Entered}

Key Items of Evaluation

{No Data Entered}

V(A). Planned Program (Summary)

Program # 11

1. Name of the Planned Program

Sustainable Energy

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
205	Plant Management Systems	0%		100%	
	Total	0%		100%	

V(C). Planned Program (Inputs)

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

Year: 2010	Extension		Research	
	1862	1890	1862	1890
Actual	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**
0	0	0	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
0	0	0	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

Activities for this area are listed under Sustainable Management of Natural Resources.

2. Brief description of the target audience

See Sustainable Management of Natural Resources.

V(E). Planned Program (Outputs)

1. Standard output measures

2010	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Plan	{NO DATA	{NO DATA	{NO DATA	{NO DATA
Actual	0	0	0	0

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

Patent Applications Submitted

Year: 2010

Plan:

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2010	Extension	Research	Total
Actual	0	0	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.
  Not reporting on this Output for this Annual Report

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	# of research articles published

Outcome #1

1. **Outcome Measures**

# of research articles published

Not Reporting on this Outcome Measure

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Economy
- Public Policy changes
- Competing Public priorities
- Competing Programmatic Challenges

Brief Explanation

See Sustainable Management of Natural Resources.

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

1. Evaluation Studies Planned

Evaluation Results

{No Data Entered}

Key Items of Evaluation

{No Data Entered}

V(A). Planned Program (Summary)

Program # 12

1. Name of the Planned Program

Childhood Obesity

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
724	Healthy Lifestyle	100%		100%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

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

Year: 2010	Extension		Research	
	1862	1890	1862	1890
Actual	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**
0	0	0	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
0	0	0	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

Activities for this area are listed under Health and Wellbeing.

2. Brief description of the target audience

See Health and Wellbeing.

V(E). Planned Program (Outputs)

1. Standard output measures

2010	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Plan	{NO DATA	{NO DATA	{NO DATA	{NO DATA
Actual	0	0	0	0

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

Patent Applications Submitted

Year: 2010

Plan:

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2010	Extension	Research	Total
Actual	0	0	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.
  Not reporting on this Output for this Annual Report

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	# of people adopting healthy food recommendations

Outcome #1

1. **Outcome Measures**

# of people adopting healthy food recommendations

Not Reporting on this Outcome Measure

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Appropriations changes
- Competing Public priorities
- Competing Programmatic Challenges

Brief Explanation

Activities for this area are listed under Health and Wellbeing.

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

1. Evaluation Studies Planned

Evaluation Results

{No Data Entered}

Key Items of Evaluation

{No Data Entered}