V(A). Planned Program (Summary)

Program # 1

1. Name of the Planned Program

Global Food Security and Hunger

☑ Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
101	Appraisal of Soil Resources	8%		8%	
102	Soil, Plant, Water, Nutrient Relationships	5%		5%	
201	Plant Genome, Genetics, and Genetic Mechanisms	6%		6%	
202	Plant Genetic Resources	6%		6%	
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants	14%		14%	
204	Plant Product Quality and Utility (Preharvest)	6%		6%	
205	Plant Management Systems	5%		5%	
206	Basic Plant Biology	4%		4%	
211	Insects, Mites, and Other Arthropods Affecting Plants	4%		4%	
212	Pathogens and Nematodes Affecting Plants	12%		12%	
214	Vertebrates, Mollusks, and Other Pests Affecting Plants	2%		2%	
215	Biological Control of Pests Affecting Plants	1%		1%	
216	Integrated Pest Management Systems	2%		2%	
301	Reproductive Performance of Animals	10%		10%	
302	Nutrient Utilization in Animals	10%		10%	
305	Animal Physiological Processes	1%		1%	
312	External Parasites and Pests of Animals	4%		4%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2013	Extension		Research	
	1862	1890	1862	1890

Plan	3.0	0.0	6.6	0.0
Actual Paid Professional	14.6	0.0	26.8	0.0
Actual Volunteer	0.0	0.0	0.0	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	**1890 Extension**	**Hatch**	**Evans-Allen**
1171713	0	2395124	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
1171713	0	2395124	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

Sixty mature Rambouillet ewes were used to examine effects of estrus synchronization at 2 stages of the estrous cycle on serum progesterone profiles and conception rates. The objective of the study was to determine if fertility was impacted by CIDR use at different stages of the estrous cycle. The CIDR has been previously shown to effectively synchronize estrus by reliable delivery of progesterone. As a reproductive tool, it will allow producers to manipulate time of lambing, take advantage of seasonal markets, consolidate feed and facility use as well as maintain a tight synchrony of lambing.

Research 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 also demonstrated that the negative effects of inflammation and stress on nitrogen balance can be alleviated by increasing the dietary crude protein concentrations from 14.5 to 16%. However, providing supplemental dietary methionine alone to growing beef steers does not alleviate the negative effects of infection on nitrogen balance. Research also 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, research demonstrated that supplementation of rumen-protected methionine to growing feedlot heifers increased animal performance and feed efficiency, but did not affect morbidity. Responses to supplementing newly received feedlot calves with rumen-protected branched-chain amino acids were variable. An initial study demonstrated that rumen-protected branched-chain amino acids improved performance and the adaptive immune responses of newly-received feedlot steers. However, a second study at the Clayton Livestock Research Center showed that supplementation of rumen-protected branched-chain amino acids for 28 days after initial processing increased dry matter intake, but did not improve performance and health of newly received feedlot calves. Additionally, our research demonstrated that plasma amino acid concentrations decreased in bottle-fed Holstein calves exposed to an endotoxin. This suggests that

metabolic demand for amino acids may increase during periods of immunological stress. However, fortifying a 20% crude protein milk replacer with additional essential amino acids did not improve nitrogen retention of bottle-fed calves, which implies that the milk replacer was not limiting in essential amino acids. Additional feedlot cattle research demonstrated that delaying a bovine viral diarrhea vaccination and initial growth implant for 28 days tended to decrease calf performance during the first 56 days on feed in the feedlot. Therefore, delaying a bovine viral diarrhea vaccination and initial growth implant did not improve efficacy of the vaccination and implant program in stressed calves receiving antibiotic therapy.

Three field studies were completed to evaluate the strategic placement of low-moisture block protein supplement (LMB) and low-stress herding (LSH) are effective for manipulating distribution of grazing cattle in large, topographically diverse pastures without additional fencing or water. A 2-year study was completed near Tucson, Arizona in mountainous terrain of the Sonoran desert dominated by lehmann lovegrass (Eragrostis lehmanniana NEES). Another 2-year study was completed in Chihuahuan desert rangeland near Las Cruces, NM. A 1-year study was conducted in Juniper/Ponderosa pine mountain rangeland near Cloudcroft, New Mexico. Overall, targeted cattle grazing using LMB and LSH was effective in reducing fine fuels at moderate levels (~40 to 50%) on diverse rangelands. This may be particularly important for focusing cattle grazing in specific areas within large pastures where utilization is generally low because of rough topography or at locations farther than 1 to 2 km from water.

The fire models BehavePlus and FlamMap were used to evaluate how reductions in herbaceous fuels and fuel bed depth would be expected to alter fire intensity and behavior, assuming a 60.7 ha target area. Targeted cattle grazing (TCG) was able to alter fire behavior most effectively when both fine fuels and stubble height were reduced to levels observed in the Arizona study. Grazing treatments were more effective in grass dominated areas compared to grass/shrub sites, which may require additional or alternative fuel treatments. Fire models projected that flame lengths with moderate fuel moisture conditions would be reduced by over 1.2 m with TCG. On grass-dominated sites rate of fire spread was reduced by about half except with extremely dry conditions. Cattle grazing treatments shortened the distance traveled by simulated fire by about 1.6 km. Costs of using TCG treatments will vary widely depending on the situation of implementation. Grazing treatments along an urban/wildland urban interface area would likely be more costly but potentially provide large payoffs in reduced fire hazard and fire intensity. Targeted grazing treatments conducted in Arizona and New Mexico were used as the basis for estimating the time, effort and costs required to implement TCG treatments along the urban interface and on existing grazing allotments. Targeted cattle grazing may be most advantageous when relatively small reductions in fine fuels are desired. If fine fuel reductions of over about 700 kg/ha are desired, holding animals with temporary electric fence would be more cost effective than using low-stress herding and supplement. Targeted cattle grazing can be a feasible alternative to reduce fine fuels in some scenarios because costs are similar to alternative treatments to control fine fuels such as mowing and prescribed fire.

Abnormalities in placental development (i.e., placentation) occur early in gestation and are a fundamental cause of pregnancy loss in livestock, causing a serious economic drain on producers. Improving livestock fertility is paramount for efficient agricultural productivity and sustainability of food supplies. Establishment of functional fetal and placental circulation is one of the earliest events during embryonic development and proper placental vascular development is extremely important for fetal growth and survival. Aberrant vascular development is linked to a number of serious pregnancy-related complications including intrauterine growth restriction, preeclampsia or early pregnancy loss. A comprehensive understanding of the sub-cellular, molecular mechanisms involved in vascularization and growth of the placenta will help reveal causes of poor fertility and provide fundamental knowledge to improve reproductive success in livestock. As each pregnancy loss is estimated to cost the producer $600, improvements in reproductive success will reap drastic savings for producers. The impacts from our studies are the generation of fundamental knowledge with respect to factors driving vascularization of the placenta to improve food-animal management. Research leading to improvements in livestock productivity helps not only the farmer and Our work on the response of chile pepper and cotton plants to salinity has

helped identify some varieties that are more sensitive or tolerant to salts during germination and emergence stages. Selection of salt-tolerant chile pepper varieties will improve local economies by reducing water requirements for irrigation and improve agricultural yields of chile and cotton, both important New Mexico commodities.

Chemokines and their receptors may be fundamental factors regulating implantation and vascularization of the placenta. The C-X-C chemokine receptor 4 (CXCR4) is up regulated in endometrium during early pregnancy and has only one recognized ligand, (C-X-C motif) ligand 12 (CXCL12). We have recently shown increased CXCL12 and CXCR4 mRNA and protein expression in ovine fetal (trophoblast) and maternal placental tissues during the timeframe of fetal attachment and placental development. However, the specific localization of CXCL12 and CXCR4 in fetal and uterine tissues during early gestation has not been evaluated. We propose CXCL12/CXCR4 signaling plays a role in maternal-fetal communication and possibly contributes to fetal attachment and subsequent placentation. Further, CXCL12 promotes recruitment of select white blood cells into human decidual tissues. These reports, suggest that similar recruitment of immune cells may occur in livestock. To our knowledge, this is the first report characterizing localization of CXCL12 in uterine and fetal tissue of ruminants during early gestation, thus providing new insights into the importance of this chemokine during attachment and placental development. Results from these studies have augmented our understanding of how CXCL12/CXCR4 signaling is affecting early pregnancy in livestock.

NuMex 01 is a high oleic Valencia peanut (Arachis hypogaea L. subsp. fastigiata var. fastigiata) cultivar, developed by the New Mexico Agricultural Experiment Station and released on September 17, 2013. NuMex 01 originated from a cross made between 'New Mexico Valencia A' (NM Valencia A) and 'Brantley'. NM Valencia A has predominantly 3- to 4-seeded pods, while Brantley has mostly two-seeded large Virginia pods. NuMex 01 is the first high oleic Valencia peanut cultivar released (O/L ratio 23.3 compared to 1.1 in NM Valencia A). It has better taste and good roasted flavor attributes.

In 2013, we initiated a new trial on assessing dual purpose (forage and grain) production of winter canola in comparison to winter wheat. Early September planted winter canola produced higher forage yield compared to winter wheat for most of the winter and early spring season. The quality of winter canola forage, especially crude protein, was much better than winter wheat. In general, differences between canola cultivars were smaller than the differences between two species. Dual purpose canola production is a promising technology to reduce forage shortage in the region. Underutilized crops like Quinoa and Amaranth are promising in drier New Mexico and preliminary trials are being conducted.

We continued to work with compensated root water uptake using partial rootzone drying (PRD) techniques. The experiments were conducted using chile plants (NuMex Joe Parker; Capsicum annuum). Results supported our previous observations that chile plants were able to take up more water from less water stressed part of the soil profile while maintaining the transpiration rate at the same rate as control treatment. No significant differences were noted in the plant heights between treatments. Water balance analysis showed that PRD techniques have a potential to be adopted as water saving practices in chile production especially for environments with limited water.

Cotton is one of the most important field crops in New Mexico, with a total value of ca. $90 million from lint and seed production. As a niche market for organic cotton and cotton with premium fiber quality, southern New Mexico farmers still grow both conventional Acala cotton and Sea-Island (Pima) cotton that were developed by New Mexico State University at an estimated 10% of the cotton acreage (but not reported by USDA). The newly released Acala 1517-08 increased lint yield by 20% over the check - Acala 1517-99 and its replacement of the older Acala 1517 cultivar will have a significant economic impact. When this new cultivar is grown in 20% of the cotton acreage in the state, its yield increase will be translated to 2 million pounds more fibers, equivalent to 1.8 million dollars. Several new advanced breeding lines averaged 20-30% more yield than Acala 1517-08 based on multiple tests and their

commercialization in 20% of the cotton acreage will further improve the net return (by 1.8 million dollars) for cotton producers in New Mexico. A new glandless cotton line with comparable lint yield to Acala 1517-08 has been developed and its production will lead to added value to the cottonseed since it can be used as a source for human food and a feed for non- ruminant animals. In summary, the NMSU cotton breeding program is continuing to make progress in further increasing cotton yield and improving other traits, providing promising breeding lines in the pipeline for producers in the southwest region. The use of these new products will significantly increase the net income for the New Mexico producer through technology transfer and dissemination.

Since 2005, sorghum grown for silage has increased 75% and statewide production has nearly doubled over the past several years from 210 to 400 thousand tons. This indicates that producers are learning of forage sorghum benefits, particularly the water-saving benefits that allow for money savings and disaster prevention. In addition, milk production in New Mexico has increased 17% over the same period, indicating that increased feeding of sorghum silage has not negatively impacted milk production, as some feared. Producers have been educated on best management practices of forage sorghums and corn in limited irrigation situations and their knowledge has been increased significantly about such systems. Awareness of the urgency to produce more water-conserving crops has been increased as the landscape has changed, particularly in eastern New Mexico, to include more irrigated sorghum crops (both silage and hay). This has only been strengthened due to extreme drought in 2011-2013. The variety testing program is used to evaluate variety and hybrid adaptation to both irrigated and dryland growing scenarios in eastern New Mexico. Use of better-adapted varieties allows growers to utilize their resources more efficiently and leads to economic savings. Particularly, more efficient water and nitrogen utilization contributes to conservation efforts and sustainable agricultural production. Requests for variety information are on the rise, especially with respect to forage and grain sorghums, which are gaining popularity in silage and dryland grain production systems that are hindered by limited water quantities and droughts. Multi-year results indicate that conventional forage sorghums can out-yield corn under restricted irrigation. Dry matter produced per unit of irrigation water is greater for conventional forage sorghums than for corn at restricted irrigation rates. However, corn is more affected by in-season rainfall and this variable determines how well corn competes with conventional forage sorghum in any given year. Forage sorghum is more consistent in its productivity regardless of year. Results have also indicated that on-farm inputs can be reduced by 25% without any detriment to productivity of the forage sorghum silage crops grown with restricted amounts of irrigation.

A second year of studies was completed in late 2012 investigating the effects of ultra-low irrigation and dryland systems on corn and sorghum grown for grain. This project is irrigated via subsurface drip tapes and allows for multiple water treatments to be applied to the two crops (along with 2 varieties each and 2 seeding rates). It focuses on when and how much water is needed at different growth stages in order to utilize the low amounts most effectively. Preliminary results indicate that both corn and sorghum can be relatively productive with minimal amounts of water, with corn requiring slightly more to be economical. Grain sorghum is the most advantageous under true dryland conditions, but even small amounts of irrigation added to the system quickly makes corn just as competitive from a yield standpoint. This work is encouraging in that adequate yields were obtained with low irrigation both years in perhaps the worst two drought years on record for the Clovis Agricultural Science Center.

Producers need reliable information on which crop cultivars will produce well in their region. Some strawberry cultivars available in seed and nursery catalogs will do fine in other parts of the country, but will fail in New Mexico because of climate and soil differences. Results from our study show which cultivars grow well in our region.

The Evapotranspiration (ET) internet site is nearly complete. Farmers will be able to access this site and track irrigation water use. They will be able to follow the water use for their crop and determine when to irrigate next. This internet site will help the farmer to use the right amount of water at the right time. As

farmers properly manage water applications, other input costs will be minimized. A presentation on this internet site is scheduled for presentation in the spring of 2014. Developing a simple spreadsheet tool that will evaluate irrigation pump performance, will help irrigation farmers track energy use and efficiency and help identify any problems that are developing. This tool will identify a problem before thousands of dollars are lost to inefficient pumping. Developing a low cost, easy to construct water control gate will help irrigation districts and farmers manage water more efficiently. This device will be safer than stop-log structures and individual irrigation districts or farmers will be able to construct this gate with common fabrication tools that they have available. Canal control algorithms will help irrigation districts determine how much water to divert down canals to meet the water demands of individual farms. Water use will be matched to the needs of the water users with little or no waste.

The NMSU alfalfa cultivar, NuMex Bill Melton, was developed for hay production in arid and semiarid environments of the southwestern U.S. that possess both abundant and limited irrigation capabilities. Seed of this cultivar is being commercially produced as part of an exclusive release agreement between the New Mexico Agricultural Experiment Station and a member of the alfalfa seed industry. In 2013, our industry cooperator in California produced foundation-class seed of NuMex Bill Melton. Certified seed of this variety should be available to farmers in 2015. In a separate study, we employed DNA marker assisted selection (MAS) to transfer 10 DNA markers from an experimental alfalfa population into different elite cultivar backgrounds over two generations. These markers were previously determined to be associated with alfalfa forage yield and root biomass productivity during drought stress. These MAS-derived populations were evaluated in 2011-2012 under limited irrigation (LI) and normal irrigation (NI) management field conditions near Las Cruces, NM. In the first-generation MAS populations, selection for high shoot and high root biomass markers, and selection against low shoot and low root biomass markers, benefited forage productivity by 3 to 23% in the LI study. These same populations, however, yielded similarly to each other in the NI study. To produce the second-generation MAS populations, six of the first-generation MAS populations were each mated to three alfalfa cultivars which possessed varying degrees of drought tolerance. Significant forage yield differences were detected among the six MAS hybrids within each cultivar group in both the LI and NI studies. These results suggested that marker assisted selection impacted alfalfa productivity in all three cultivar genetic backgrounds.

Germplasm was identified that possessed a reduced number of thrips per plant than most entries. Entries were identified that exhibited less severe IYS disease symptoms than most entries. Selection for reduced thrips number and IYS disease severity appears to be effective. Additional cycles of selection may be beneficial for increasing tolerance to thrips and/or IYS. The onion industry in New Mexico and the United States is valued at farm gate annually at 50-60 million dollars and 900- 1,000 million dollars, respectively. The potential impacts of this study are the offsets of yield reduction caused by IYS and onion thrips and the cost of chemical control of thrips. The potential economic impacts of this research could be 10-15% of the current farm-gate value that is estimated to be lost due to injury from IYS and onion thrips. In addition, the cost of chemical control of thrips, which is estimated at 7.5-12 million dollars, could be saved with the availability of a thrips-tolerant onion cultivar.

The Southwest Border Food Safety and Defense Center was formed in 2005 by the NMSU College of Agricultural, Consumer and Environmental Sciences, NMSU Cooperative Extension Service and the New Mexico Department of Agriculture to help protect the nation's food supply against security threats ranging from events such as foodborne illnesses and supply chain disruptions, to agro-terrorism. The center assesses the security of agriculture operations and provides training for farmers, dairy and livestock producers, public health officials, law enforcement, and the public. The center maintains first-response trailers in communities in central, southern, and eastern New Mexico stocked with equipment to help officials respond to an agriculture emergency. The Center helps coordinate the Emergency Support Function responding to disasters involving agriculture and food, as well as coordinating with other Emergency Support Functions on small animal evacuation and care. The Center distributes emergency

preparedness kits at various events across New Mexico. The Center also collaborates with other institutions such as Louisiana State University and the University of Tennessee, Knoxville on emergency preparedness and response training for the nation and other countries. In the first half of 2013, the Center and its partners trained or provided information to approximately 300,000 New Mexico residents. The New Mexico Department of Homeland Security and Emergency Management partners with the Center for all agriculture- and food-related training opportunities in New Mexico. The Center hosts exercises with partners from across New Mexico, and other states, including the 10 U.S. and Mexican states along the border. The Center trained Cooperative Extension Service county agents to help their county governments develop agriculture preparedness plans. The project trains personnel to write an agriculture emergency operation plan annex to their all hazards emergency operations plan.Extension agents and specialists, and New Mexico Department of Agriculture and New Mexico Livestock Board personnel have all been trained in agriculture bio-security and whole community food protection; the elements of food defense being food safety, food defense and food security.

The New Mexico Agriculture Livestock Incident Response Team or the ALIRT/Syndromic Surveillance Project is quickly becoming the model for animal disease surveillance across the nation utilizing veterinarians who have been trained as first responders. ALIRT includes livestock board inspectors, Extension agents, and 20 large animal veterinarians who are a trained first responder team for incidents involving livestock.

The drought situation in New Mexico has severely impacted livestock numbers, particularly cattle numbers. This along with other factors such as inflated land values, high fuel, and high operating cost limits production profitability to producers, which is marginal at best. Statewide and regional programs each year will include the Cattle Grower's Short course, Southwest Beef Symposium, Cattlemen's college and Cow-Calf standardized Performance Analysis program. Additionally, management recommendations and strategies are incorporated into Extension publications, event proceedings and local/area press.

By following a few general composting recommendations, whole animal composting can be a successful, environmentally safe, and economically feasible method for disposing on-farm carcasses. Cost of whole animal composting, which includes a synthetic liner (if used), is estimated to be approximately $4 per carcass. However, composting procedures are not absolute and are somewhat forgiving. Trial and error accompanied by close monitoring of pile characteristics will usually produce successful results. Carcass compost is an excellent source of fertilizer for crops used by the dairy farm. However, the compost generated from decomposed animal carcasses should not be given away or sold as compost for off-farm use.

Hypera postica (Gyllenhal) (Coleoptera: Curculionidae), is one of the most significant insect pests in alfalfa in New Mexico. Each year, producers report significant economic losses due to this pest, particularly on first cuts. Most of the damage occurs early in the growing season when weevil populations are high and natural predator and parasitoid populations tend to be low. Typically, the first and second cuttings of alfalfa are the most heavily damaged. Yield reductions as high as 1,000 to 1,500 lb/ac have been recorded in research trials in Artesia and the Mesilla Valley in the 1980s, when such losses were considered common. Biological control has lessened those losses somewhat, particularly in the Mesilla Valley and particularly since 2000, but in some areas and in some years, growers still experience significant losses. The cotton season has almost ended and most farmers in the State have finished with harvesting. Pest and disease pressures were minimal this year and some growers have reported slightly above average yield. However, cotton acreage was much less than in 2012 due to uncertainties in the price of cotton. About 30,000 acres of cotton were planted in NM, which is about a 35% drop in acreage compared to 2012. At this year's cotton conference, over 85% of attendees were satisfied with the information presented.

The New Mexico wine industry revenue doubled in the last five years to approximately $60 million. This increase reflects the commercial activity of many New Mexicans. The largest share of the revenue is generated by direct marketing efforts using tasting room sales, winery tours and wine festivals. Due to the diversified nature of the industry most of this money stays in the local economy and creates increased local economic activity through the multiplier effect.

As drought continues to persist in New Mexico, producers are searching for alternative hay crops that will produce large amounts of forage with minimal water in a short amount of time. Teff is one such grass that may meet this demand. Interest in Teff as hay for horses has grown in the southwestern USA where the predominant warm-season annual forages are sorghums, which are not suitable for horses. Teff, a warm-season annual grass used as high quality forage, is considered to be widely adapted and even heat and drought tolerant, as well as tolerant to waterlogged soils. Teff has very fine stems, is leafy, and forage quality when harvested at late boot to early heading is similar to full bloom alfalfa, making it acceptable as horse hay being preferred equally to timothy and orchard grass hay by horses. Teff is also a very suitable forage for cattle (beef and dairy) and sheep. Feeding studies have demonstrated the value of Teff for obese horses and others that require lower levels of digestible energy due to risk for metabolic disorders such as laminitis. Fast-growing summer annuals can be utilized to a great extent in New Mexico as emergency forage and can be planted late in much of the state with our long growing seasons. This year, because sorghum (e.g., hay grazers) seed supply is short and not suitable for horses anyway, Teff offers a great alternative that can fill the forage gap during dry periods or during alfalfa field rotations. Due to the higher price of seed, seeding costs for Teff can be as high as $20-30/ac. As such, producers should assess their hay and livestock needs and also their potential market before determining which crop is best suited for their situation.

At the combined soil workshops attended by over 300 across the state about 85% of the respondents found information on soil health useful for their production practices. Over 60% of the respondents plan to engage in at least a specific method to build their soil health.

Soil compaction occurs when soil particles are compressed together--especially when the soil is wet--destroying soil structure, reducing porosity, and leading to a more dense soil that is hard for crop roots and water to penetrate. Changes in agricultural practices, such as increased number of field operations and larger equipment, have made soil compaction more common on many fields. Field operations, such as silage crop harvest when the soil is wet, can lead to severe soil compaction.

Proper weed identification and knowledge of effective weed management strategies is critical for development and implementation of effective, economical, and environmentally sound weed management practices. Quotes from weed workshop surveys: "Very logical presentation by knowledgeable professor." "I really enjoyed your class." "Very helpful; great discussion on herbicides and other methods of control." "Very effective speaker, made weed management interesting to me."

2. Brief description of the target audience

The target audience includes: ranchers, feedlot operators, dairy producers. small/medium/large-scale agricultural operations, business, associations, cooperatives, consulting firms and collectives that might or might not be defined as a farm under the USDA economic return criteria, but are land owners, managers, consultants, or students who wish to improve agricultural production and efficiency. Other audience participants include Extension agents, other agricultural specialists, pesticide applicators, Master Gardeners and garden clubs, youth (4H, Future Farmers of America and other groups) and the general public.

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2013	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	100000	0	8677	0

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

Patent Applications Submitted

Year:	2013
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2013	Extension	Research	Total
Actual	5	5	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

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

Year	Actual
2013	0

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

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

Outcome #1

1. Outcome Measures

# of trained professionals

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	21

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

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

Outcome #2

1. Outcome Measures

# of improved animal varieties

Not Reporting on this Outcome Measure

Outcome #3

1. Outcome Measures

# of research publications

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	105

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
101	Appraisal of Soil Resources
102	Soil, Plant, Water, Nutrient Relationships
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

206	Basic Plant Biology
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Pathogens and Nematodes Affecting Plants
214	Vertebrates, Mollusks, and Other Pests Affecting Plants
215	Biological Control of Pests Affecting Plants
216	Integrated Pest Management Systems
301	Reproductive Performance of Animals
302	Nutrient Utilization in Animals
305	Animal Physiological Processes
312	External Parasites and Pests of Animals

Outcome #4

1. Outcome Measures

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

Not Reporting on this Outcome Measure

Outcome #5

1. Outcome Measures

Extension publications

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	31

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Information is made available to producers.

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
204	Plant Product Quality and Utility (Preharvest)
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants
215	Biological Control of Pests Affecting Plants
216	Integrated Pest Management Systems
301	Reproductive Performance of Animals
302	Nutrient Utilization in Animals
305	Animal Physiological Processes

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)

Evaluation Results

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

Key Items of Evaluation

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

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