NEW MEXICO STATE UNIVERSITY
COLLEGE OF AGRICULTURE AND HOME ECONOMICS
ANNUAL REPORT OF ACCOMPLISHMENTS AND RESULTS

New Mexico Agricultural Experiment Station
and
New Mexico Cooperative Extension Service

For the Period Covering
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A. Planned Programs

Goal 1: An agricultural system that is highly competitive in the global economy.

Overview

New Mexico 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 anew 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.

The New Mexico Agricultural Experiment Station and Cooperative Extension Service believe that they are meeting the short-term goals outlined under Goal 1 in the 5-year Plan of Work submitted in July 1999.

Total expenditures for Goal 1 were $396,464 from Hatch Act funds. The number of full-time equivalents engaged in research for this goal was 11.55 FTE.

Total expenditures for Goal 1 were $368,612 from Smith-Lever Act 3(b)(c) appropriated funds. The number of state-level full-time equivalents engaged for this goal was 11.79 FTE.

1. Agricultural Experiment Station

Key Theme – Agricultural Competitiveness

a. Description of Activity

This program develops chile and onion cultivars for growers in New Mexico. The chile industry is a large employer in New Mexico. Keeping it competitive keeps the industry here instead of it moving out of state or offshore. Elucidation of taxonomic relationships among wild *Capsicum* species will open new genetic avenues for plant breeders to use. Very few commercial onion cultivars are adapted to the growing conditions found in New Mexico. In addition, the onion acreage in New Mexico is too small to warrant

specific cultivar development by commercial seed companies. Our program develops high yielding, high quality, disease resistant, and bolting resistant cultivars that allow growers in New Mexico to be competitive with other onion markets in the United States.

b. Impacts/accomplishments

- NMSU scientists discovered a new disease syndrome, stem blight. This means that there are at least three separate genetic systems controlling resistance.

- Research findings will impact the industry by providing a new southern root knot resistant cultivar to the industry. The majority of cayennes are processed in the area, so the impact value of the addition of a new cayenne cultivar is multiplied by the increased value of the processed product. If male-sterility can help in providing an inexpensive hybrid seed production system, then the direct seeding of the chile pepper crop can be done with hybrid seed.

- Chile peppers are an important part of New Mexico's heritage and economic development. New Mexico State University has the longest continuous program of chile pepper improvement in the world. All New Mexican (Anaheim) green and red chile pepper types grown today gained their genetic base from cultivars first developed at New Mexico State University. According to the New Mexico Department of Agriculture statistics, chile peppers were worth $49 million at farm gate in 2002. With the majority of chile peppers processed, the chile pepper crop is worth much more. Improving 'New Mexico 6-4' and 'NuMex Big Jim' is important for the continued success of the industry. In addition, an improved open-pollinated cayenne cultivar would be important to cayenne production in the Southern New Mexico production area. The cayenne industry in New Mexico has the potential for further growth and a high yielding open-pollinated cultivar with lower seed cost would aid in keeping growers competitive in the world arena.

- Open-pollinated, male-sterile, maintainer, and pollinator breeding onion 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, bolting resistance, bulb yield, and bulb quality. Onion bulb firmness was measured using two methods for fall-sown, transplanted, and spring-sown open pollinated and hybrid cultivars and breeding lines.

- The New Mexico onion industry is economically significant and is highly competitive. The industry has a recent history of expansion, and the potential for further expansion. Further development and release of high-yielding, high-quality, well-adapted, bolting-resistant, disease-resistant, short-, intermediate-, and long-day onion open-pollinated, and hybrid varieties with varying maturities, pungency levels, and scale colors will support industry growth in New Mexico. Genetic improvement in bolting resistance, disease resistance, and bulb pungency also will facilitate further expansion and add significantly to New Mexico’s economic development. Genetics and heritability studies on *Allium cepa* varieties are needed to support onion plant genetic improvement

programs for the bulb onion. Currently, New Mexico supplies up to 80% of the nation's fresh onions during the months of June and July.

c. Source of Federal Funds — Hatch

d. Scope of Impact — State Specific

Key Theme – Animal Production Efficiency

a. Description of activity

This research area focuses on increasing efficiencies of producing food from animals. Key areas of research are to improve understanding of physiological mechanisms affecting reproduction, growth, and performance.

b. Impacts/accomplishments

- Thyroid hormones play a permissive role in onset of anestrus in ewes, and thyroid hormone inhibition before onset of anestrus extends the breeding season. Realization of two lamb crops per year could have tremendous impacts on either increasing the number of lambs born each year or producing the same number of lambs with fewer ewes.

- Efforts have been made to further evaluate relationships of genetic markers and physiologic response to performance of cattle. More specifically, relationships of GH gene polymorphisms to pituitary responsiveness to GHRH were evaluated in 8 month-old Bos taurus (Angus) and Bos indicus-derivative (Brahman, F1-Brahman x Angus, and Brangus-3/8:5/8) bulls. Ruminant livestock represent 70% of the gross receipts of the 2 billion dollar agriculture industry in NM and this research will contribute to its efficiency of production of ruminant livestock. More specifically, these data will contribute to the knowledge of needed to improve sire selection for improved growth and carcass characteristics of cattle. Efforts will also lead to improved reproductive efficiency of NM beef herds.

- Current findings of this project demonstrates that methionine, and at least one of the branched-chain amino acids, may limit the growth of lambs when fed a diet containing protein that is mostly degraded in the rumen. Further research will be conducted to determine which of the branched-chain amino acids (leucine, isoleucine, or valine) were limiting in lambs. This research provides insight towards optimizing amino acid utilization by growing sheep by identifying those essential amino acids that limit protein deposition, thereby providing the opportunity to improve the efficiency of protein (amino acid) utilization through supplementation strategies.

- The ability of the corpus luteum to regress is dependent upon prostaglandin F2 alpha from uterine and ovarian sources. NMSU scientists have developed an in vivo model to determine if inhibition of prostaglandin production by the corpus luteum affects luteolysis in the cow. Additional studies have determined that reproduction function in the cow is sensitive to short term feed deprivation, a common occurrence in New Mexico

and the Western US. Pregnancy losses due to inadequate progesterone from the corpus luteum are estimated to approach 30% in ruminant females. Increasing calving rate 5% (to 92%) would result in an additional 27,000 head weaned or an additional 13.6 million lbs of calves weaned in New Mexico. Based on these figures the increase of 5% in calving rate would increase economic return approximately 10 million dollars to NM ranchers.

c. Source of Federal Funds — Hatch

d. Scope of Impact — Multi-state Research
- with states AK, AZ, CA, CO, HI, ID, ME, MN, MO,MT, NE, NV, OH, OR, TX, WA, WY

Key Theme – Managing Change in Agricultural Systems

a. Description of activity

The aim of this project is to develop and evaluate strategies for managing change in agriculture by determining the technical feasibility and profitability of new and modified systems of agricultural production, and by evaluating strategies for improving the efficiency of irrigation delivery.

b. Impacts/accomplishments

- NMSU researchers have demonstrated that residual forage can; be comparable to, and cattle gains and pasture productivity can be higher from; light stocking density as compared with higher densities. If these results can be shown to be transferable to rangeland situations, they will support the use of light stock densities to maximize beef production per unit of area.

- Winter wheat grain trials, small grain forage trials, corn and sorghum grain trials and corn and sorghum forage trials are being used to evaluate variety and hybrid adaptation to irrigated and dry-land growing conditions in eastern New Mexico. If proper variety selection results in a 62 kg ha-1 increase in crop yield, the economic impact on eastern New Mexico will exceed $2 million annually.

- Producers growing hay for the dairy industry can improve nutritive value of winter cereal forages by intercropping with Austrian winter pea or hairy vetch under limited irrigation without a great sacrifice in yield. Irrigated pasture producers can include alfalfa with tall wheatgrass to improve seasonal distribution of yield during summer months. Some species of legume, while not producing as much forage as alfalfa, can provide equal consistency across soil moisture treatments and in seasonal distribution of yield. Results of alfalfa variety testing indicate that selecting improved, high-yielding cultivars could increase productivity for alfalfa hay growers.

- Warm- and cool-season turfgrass screening trials continue evaluation at the NMSU Agricultural Science Center at Tucumcari to determine those grasses that are best adapted

to New Mexico growing conditions. Screening of selected turfgrasses will identify adapted turfgrasses that contribute to aesthetic home sites and recreation areas.

c. Source of Federal Funds — Hatch

d. Scope of Impact — State Specific

Key Theme – Ornamental/Green Agriculture

a. Description of activity

The objectives of the ornamental horticulture research program are to bio-rationally increase the post-production life of harvested products, particularly cut flowers, to improve nutrient management and protect surface and groundwater resources, and to alleviate salinity stress of plants growing in salt-affected environments and at sites of low soil and water quality.

b. Impacts/accomplishments

- The turfgrass research findings will aid in maximizing acceptable Bermuda grass quality, while minimizing maintenance costs and environmental impact of nitrogen fertilization, and emphasize the importance of residual soil nitrogen assessments in limiting fertilizer nitrogen losses to the environment.

- A recently-established wastewater application study will allow NMSU scientists to develop and disseminate an input-based management plan favoring best irrigation management practices to exploit the land and vegetation for wastewater disposal, and to prevent undue harm to the site. The ultimate economic impact of this project is apparent when considering the low-inputs of land application (<$50,000 per year in operation and maintenance) versus the multi-million dollar option of an engineered wastewater treatment plant plus its associated annual maintenance, operational, and depreciation costs. These data will aid in determining total vegetation removal of effluent components, preventing adverse environmental impact to the site, and developing a practical management plan suitable for small communities seeking cost-effective wastewater handling protocols.

- Results on trees point to the importance of environmental monitoring and assessment of vegetation in response to saline water application. One *Lupinus havardii* plant can produce as many as 30 blooms that sell for $1 each in the wholesale trade. Three hundred plants could return about $9,000 in supplemental gross annual income while needing less than 1,000 square feet of greenhouse space.

c. Source of Federal Funds—Hatch

d. Scope of Impact—State Specific

Key Theme – Plant Genomics

a. Description of activities

This research area focuses on elucidating fundamental biochemical processes of crop plants. The research also seeks to develop methods to manipulate biochemical processes within living plants to increase crop productivity and drought tolerance, and to provide alternative crops for new markets.

b. Impacts/accomplishments

- NMSU Agricultural Experiment Station scientists have shown that GS1 in plants is regulated at the level of transcript turnover and at the translational level. Researchers have identified a single putative plastidic glutamine synthetase (GS2), isolated from *Medicago sativa* (alfalfa) leaf. We show that, although expressed in the photorespiratory tissues, the alfalfa GS2 gene is also expressed in nitrogen fixing root nodules where its expression is not regulated by fixed nitrogen. In the roots NO_3- appears to act as a direct signal for the induction of GS2 whereas in the leaves secondary metabolites of NO_3- probably act as the signal. Understanding the regulatory mechanism underlying the expression of GS1 in alfalfa will allow our scientists to design genetic engineering approaches to increase GS activity in the appropriate cell types. Increased GS activity in alfalfa will result in increased growth and biomass production under low nitrogen conditions thus improving its nitrogen use efficiency, which is important in areas like New Mexico.

- NMSU researchers have been applying microarray technology to characterize the changes in gene expression associated with drought stress or fungal pathogens. Specifically the comparative responses in two *Phaseolus* species to drought stress, and the comparative responses of *Capsicum annuum* lines that are resistant or susceptible to chile root rot. One student cloned and characterized a putative transcription factor for capsaicinoid biosynthesis. A second student has generated a cDNA library to begin a program to characterize the genes for saponin biosynthesis in *Datura* spp. A third student has adapted a computer program to search the promoter sequences of the capsaicinoid biosynthetic genes from Capsicum spp. This will allow us to rapidly identify key regulatory elements in these genes.

- The analysis of the chemical composition of southwestern medicinal plants has been pursued. Researchers are isolating fractions enriched in saponins from several different *Datura* spp. and *Acacia* spp. They are characterizing the essential oils in populations of *Anemopsis californica* collected from different sites throughout the state and the southwest. Researchers also are developing methods for the characterization of four additional plants of regional interest. They have established methods for antimicrobial bioassays and we are screening for anticancer activity with collaborators at the Fred Hutchinson Cancer Research Center.

- Genetic transformation techniques have been developed for peanuts, tomato, alfalfa and onion. Plant transformation of *Allium cepa* onion varieties, NuMEX 'Solano' and NuMEX

'Sunlite' with *Agrobacterium tumefaciens,* have been achieved. Protocols are in place to move these putative transformants to soil for progeny analysis. Protocols for successful regeneration of chile plants in tissue culture have been developed. *Agrobacterium* mediated transformation techniques for efficient transfer of reporter genes for enhanced expression in chile pepper (*Capsicum annuum*) are in progress.

- Genes conferring disease or pest resistance or controlling product quality are being targeted for transfer into chile pepper, onion, alfalfa, peanut and tomato. All five are high value crops important in New Mexico agriculture. Although such in vitro methods will not replace conventional breeding methods, cellular and molecular genetics approaches can play important roles in the development of crop plants suited to the semiarid agriculture.

c. Source of Federal Funds — Hatch

d. Scope of Impact — State Specific

Key Theme – Plant Germplasm

a. Description of activity

Alfalfa is New Mexico's number one cash crop and enables farmers to maintain soil productivity by rotating a perennial legume with other crops. The alfalfa industry faces diminishing yield improvements in new varieties and diminishing irrigation water resources. This research improves genetic gain in alfalfa through germplasm enhancement for diverse production environments, increased genetic diversity, and maintainence of germplasm integrity for hybrid development.

b. Impacts/accomplishments

- Early field performance results from newly developed NMSU alfalfa experimental lines indicate that these materials will be able to perform well under limited and optimum irrigation management. These materials can provide growers with maximum forage production opportunities under highly variable soil moisture conditions.

- Second year field data, from diallel hybrids derived from 18 high yielding populations of the NPGS alfalfa core collection detected significant heterosis for forage yield in several hybrids. Several hybrids outperformed the best commercial varieties. AFLP-based assessment of genetic diversity among these populations indicated that hybrid yield was positively associated with increasing genetic diversity among parents. One of the parents, which possessed high general combining ability, also appears to possess high water-use efficiency based on carbon isotope analysis results. First year field results from a commercial alfalfa variety trial indicate that two hybrids, which contain one or more NPGS plant introductions as parents, yielded as well as the best commercial cultivars.

- Private industry has expressed concern that yield loss may accompany utilization of unimproved germplasms. However, recent diallel analyses conducted by our project have

demonstrated that the forage yield of some hybrids derived from NPGS plant introductions can equal, or exceed, that of the best commercial cultivars. Statistical analysis programs for population based diallel analyses have also been developed to help identify alfalfa populations possessing high general combining ability and high heterosis potential. Populations identified in our research as having exceptional merit are being advanced for intra-population improvement. Experimental lines derived from two or more of these improved populations will be hybridized to further boost forage yields by exploiting heterosis. Our results also indicate that strategies which incorporate both molecular genetic diversity data, and some degree of agronomic performance data of parents, will likely have the greatest chance of successfully identifying parents to generate hybrid populations with maximum heterosis.

c. Source of Federal Funds — Hatch

d. Scope of Impact — State Specific

Key Theme – Plant Health

a. Descriptions of activities

Research in this area addresses the long-term goal of preventing insect-borne diseases in orchard plants.

b. Impacts/accomplishments

- Out of 12 predator and 12 parasitoid genera, sanfoin, alfalfa, and hairy vetch produced significantly more predators and sanfoin and canola significantly more parasitoids than the other treatments in late August and early September, the critical period for the buildup of black pecan aphids in pecans. These ground covers do best under properly pruned pecans which let light enter the canopy. Aphid susceptible corn also attracts large numbers of beneficials. Hairy vetch is the best ground cover tested so far. Hairy vetch has a large assemblage of parasitoids and predators and it fixes nitrogen; however, a single row of corn planted throughout the season between pecan trees also provided a large complex of beneficial insects for the control of pecan insects.

c. Source of Federal Funds — Hatch

d. Scope of Impact — Multi-state research
With states AL, AZ, GA, KS, LA, OK

Key Theme – Rangeland/Pasture Management

a. Description of activity

The purpose of this research program is to better assess economic and vegetation outcomes from different recommended grazing intensity levels on New Mexico rangelands.

b. Impacts/accomplishments

Initial results show higher cow and calf weights in conservatively stocked pastures than moderately stocked pastures. Forage production has been higher in conservatively than moderately stocked pastures. Grazing use has averaged 29% in conservatively stocked pastures and 40% in moderately stocked pastures. This research has the potential to reduce the adverse impacts of livestock grazing on rangeland soils, vegetation and wildlife. Conservative stocking leaves more residual vegetation for protection of soils, watershed, and wildlife habitat. Conservative grazing may allow forage plants to maximize their productivity and it may be more beneficial than grazing exclusion. Conservative grazing lowers rancher risks and can increase monetary returns over moderate 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.

c. Source of Federal Funds — Hatch

d. Scope of Impact — State Specific

Key Theme – Small Farm Viability

a. Description of activity

This research program seeks to assist farmers and ranchers of north-central New Mexico to use their land in a more efficient, productive, and profitable manner by developing new research-based information to assist them in improving their current cropping and crop-livestock systems. Overall objectives are: 1) To develop and evaluate cropping methods and crop-livestock systems which increase the efficiency of resource use in order to increase agricultural productivity and profitability on a per unit area basis while maintaining or enhancing the natural resource base, and 2) To evaluate crop varieties and alternative crops for their adaptation and productivity in north-central New Mexico.

b. Impacts/accomplishments

- The first Organically Certified research acres at New Mexico State University were established at the Alcalde Sustainable Agriculture Science Center to assist fruit, medicinal herb, and specialty crop growers interested in producing and marketing organically. Based on this research, several local growers have begun to grow and sell organic strawberries grossing the equivalent of up to $40,000 per acre.

- Research plots using under-tree sprinkler systems in tree fruit and drip systems in berries and medicinal herbs, have resulted in several growers adopting these methods and thus irrigating more efficiently on their farms. Several growers are also using the under-tree sprinklers for protection against late spring frosts—a serious challenge for local fruit growers.

- Evaluation of about 30 medicinal herbs in observational plots continued. Information from these studies will permit small farmers and stakeholders in northern New Mexico to supplement their income with niche products. Research on medicinal herbs as alternative high value crops is based on traditions, culture, and expansion of markets. Results indicate that, depending on current prices, returns per acre can be quite substantial. Interest in fruit and medicinal herb production has grown substantially; in 2004 we had significantly higher than expected turnouts at special-topic field days highlighting our fruit research.

c. Source of Federal Funds — Hatch

d. Scope of Impact — State specific

Key Theme – Urban Gardening

a. Description of activities

This research program focuses on the drought tolerance, water use, and requirements of ornamental plants in managed landscapes and the human factors that influence water conservation in an arid environment.

b. Impacts/accomplishments

NMSU scientists have identified a major reason for unpredictable landscape performance of Mexican elder. This will allow landscape personnel to make informed decisions about the plant's management. For big-tooth maple, several promising specimens have been selected. The project is a long-term effort, but one that has a large economic potential for the landscaping industry throughout the Southwest.

c. Source of Federal Funds — Hatch

d. Scope of Impact — State Specific

Key Theme – Irrigation Technology

a. Description of activity

The objectives of this research program are: 1) to assess and develop decision criteria for adoption of micro-irrigation technologies; and 2) to promote appropriate micro-irrigation technologies through formal and informal educational activities.

b. Impacts/accomplishments

- Landscape coefficients and climate-based irrigation scheduling recommendations for turfgrass were developed that may have wide ranging applicability in the Intermountain West and turfgrass transition zone. This research has resulted in the formulation of seasonal crop coefficients that can be used to efficiently schedule irrigations on agricultural crops and turfgrass in northwestern New Mexico and similar areas of the

Intermountain West. The volume of water that can potentially be saved through crop coefficient-based irrigation scheduling on agricultural crops has not yet been accurately quantified due to incomplete survey analyses. In urban communities, it is estimated that irrigation volumes applied to turfgrass exceed requirements by two to four times. Much of this excessive irrigation has been attributed to a lack of accurate turfgrass water-use estimates to efficiently schedule irrigations. By using the climate-based crop coefficients developed during this research project to schedule irrigations, water volumes applied to turf areas could potentially be reduced by more than half.

- A soil temperature prediction model was developed and installed on the weather.nmsu.edu internet site. The model uses air temperature and solar radiation to predict soil temperature at different depths in the soil profile. The temperature model is being tested under both flood and drip irrigation conditions. The soil temperature model is being developed along with an irrigation management model to predict the development of *Phytophthora capsici*, a soil-borne fungus causing root rot in chile plants. The model can decrease chile yield lost by helping farmers conduct proper management of irrigation.

- Studies at the Agricultural Science Center at Farmington continue to show that well-managed drip irrigation has the capability to deliver exact amounts of water and nutrients to meet crop demands. Surface drip irrigation is an effective technology for irrigating poplar trees in the Four Corners region. A long-term (10 years) production trial and a short-term (2 years) establishment trial demonstrated that hybrid poplar clones exhibit a range of responses to edaphic and environmental conditions inherent to the Four Corners region. Selection of hybrid poplar clones adapted to the region is possible.

c. Source of Federal Funds — Hatch

d. Scope of Impact — Multi-state research
With states: AL, AZ, CA, FL, GU, HI, ID, IN, IA, KS, MN, NY, OR, PR, TX, VI, VA, WY

Key Theme – Range Livestock Enterprises

a. Description of activity

Information regarding costs and returns for crop and livestock enterprises are necessary for decisions regarding input use and output mix. Most farmers and ranchers do not have sufficient records, adequate time or the analytical skills necessary to develop such cost and return information. The focus of this program is to 1) develop cost and return estimates on historical and projected bases for crop and selected livestock enterprises and farms in New Mexico; 2) provide cost and return data for use in other research projects when needed; and 3) develop accurate data on the cost of ownership and use of farm machinery and equipment in New Mexico.

b. Impacts/accomplishments

Projected 2004 crop cost and return estimates were developed and released prior to the planting season. The set of cost and return estimates includes 49 representative farms and 4 nontraditional crop situations. The set covers 39 geographical production areas, 22 different crops, several size classes, and 3 major irrigation types as well as dryland. An historical cost and return estimates manuscript for 2002 was accepted for publication. A spin-off of this effort is the use of the work in publishing extension circulars and in thesis research carried out on the applications of modern portfolio theory. The primary economic impact involves improving the decision-making of farmers and ranchers and providing needed input data to the decisions made by lenders, and the analyses of appraisers and economic researchers.

c. Source of Federal Funds — Hatch

d. Scope of Impact — State Specific

Key Theme—Agricultural Markets and Trade

a. Description of activity

Agricultural producers and agribusinesses are developing a variety of new and innovative products and marketing methods to increase their share of the consumer's food dollar. By examining current marketing efforts and those that may be considered for adoption in the future, factors that influence the success of the agricultural stakeholders can be identified. Once identified, these factors for success can be disseminated to other stakeholders, increasing the overall profitability of New Mexico agriculture.

b. Impacts/accomplishments

- Data currently are being collected to cross hedge various NM products that do not have futures or options contracts. Price risk reduction improves business stability and profitability. Currently, no more than 5% of New Mexico farms and ranches use price risk tools. If the number doubled to 10%, an additional $7 million dollars of net farm income would be generated and at least 70 farms and ranches would be saved from bankruptcy.

- By examining both the marketing efforts currently being conducted by agricultural producers and processors, and those that may be considered for adoption in the future, factors that influence the success of the agricultural stakeholders can be identified. Once identified, these factors for success can be disseminated to other stakeholders, increasing the overall profitability of New Mexico agriculture.

- Given the increasing globalization of production and marketing, agricultural protection policies that were innocuous have begun to distort trade, create unfair competition among countries, and reduce the overall social welfare that could be attained under a free trade system. Water is a vital resource in the Rio Grande Basin, and agricultural occupies

at least 80 percent of the total supply. If water is allocated inefficiently, or farmers are not able to trade water amongst themselves to alleviate excess supplies and excess demands, then the inefficiency losses from poor allocations can be substantial.

c. Source of Federal Funds — Hatch

d. Scope of Impact — State Specific

2. Cooperative Extension Service

Key Theme – Crop Management

a. Description of activity

Curriculum development for new alfalfa, cotton, corn and other agronomic crop programs was established based on a need from clientele throughout New Mexico where these crops are grown seasonally, or grown in rotation. The programs are based on farmer, consultant and other agricultural professional training, information and current needs in these crops.

b. Impacts/accomplishments

Modules over the different crops and production practices were developed and used at group training meetings; publications on growth/development and production practices on the crops were developed. Training using either Horizon Live or Centra transmission was implemented and distributed in Powerpoints in meetings or on compact disk. As a result of this program, farmers will have a resource with which to evaluate and expand their agronomic forage acres while obtaining a sustainable farming operation. This baseline of programming will again activate the statewide forage and agronomy crop Extension efforts in the state and allow the program to be rebuilt with new information and an expanded educational effort on production practices and crop scouting needs. The program will allow liaisons with other production associations, agencies and businesses so that they become active partners with the Extension educational effort in New Mexico.

c. Source of Federal Funds -Smith Lever 3(b)(c)

d. Scope of Impact -State Specific

Key Theme – Chile Pepper Task Force

a. Description of activity

The New Mexico Chile Pepper Task Force is an inter-disciplinary partnership facilitated by New Mexico State University’s College of Agriculture and Home Economics. It was developed to promote and enhance the interaction between researchers, Extension specialists, and industry leaders to maximize the efficiency and profitability of the New Mexico chile pepper industry.

b. Impacts/accomplishments

An economic analysis of the chile industry has recently been completed.

Major progress was made in the mechanical thinning and harvest cleaning projects, with addition of a full-time professional agricultural engineer. In 2003-04 the Chile Task force released a commercial mechanical thinner that will reduce costs, improve mechanical harvesting, and reduce grower liability.

Bids for a commercially-produced mechanical thinner have been approved and the thinner will be in commercial production for the 2005 growing season, offering labor-cost savings of $50-$75 per acre. Prototype mechanical cleaning equipment that combines mechanical and electronic technologies has been developed and has been tested in 2003 and 2004 with various configurations and improvements. In initial trials this equipment separated approximately 90% of harvest trash from chile pods. Further testing is underway, as are preliminary talks with commercial manufacturers. This new equipment, combined with existing mechanical harvesting machines, will make widespread mechanical harvest viable and will open even greater opportunities for reducing the cost of harvest.

The Chile Task Force has identified key management practices to streamline chile production and has disseminated them to growers through publications and the Task Force Web site. Task Force plant breeders released 'NuMex Garnet' in 2003, a paprika cultivar with characteristics that are beneficial for early season mechanical harvest.

The Task Force has worked closely with labor agencies and organizations to ensure safe working conditions for remaining industry laborers.

c. Source of Federal Funds - Smith Lever 3(b)(c)

d. Scope of Impact - State Specific

Key Theme – Animal Production Efficiency

a. Description of activity

Livestock specialists and county agricultural extension faculty, work together to provide assistance and education to livestock producers across the state. Livestock producers range from those who have been on farms and ranches for several generations to absentee owners who have little knowledge of livestock production practices. A number of methods are employed to reach producers, including one-on-one contacts, educational meetings and seminars, mass media efforts, and interaction through state livestock associations and service agencies. Livestock and non-dairy livestock products account for slightly more than 1/3 of all New Mexico farm and ranch receipts (New Mexico Agricultural Statistics 2003). Total farm and ranch receipts from livestock and non-dairy livestock products was approximately $807 million in 2003. Small increases in efficiency of production leading to increased profit can have a substantial impact on the

sustainability and economic viability of New Mexico's rural and urban communities. An increase of as little as five pounds of calf weaned per beef cow in New Mexico could add an estimated $3 million to annual ranch receipts. An increase in the pounds of lamb weaned per ewe of 10 percent could contribute an additional 1.1 million pounds of lamb to market for an increase in ranch receipts of over $750,000. An annual increase of five pounds of calf weaned per cow accrued over five years will total over $8 million. An annual increase of 10 in pounds of lamb weaned per ewe over five years will total over $3.7 million.

b. Impacts/accomplishments

Ranch to Rail was designed to help producers determine how their cattle fit the current and future needs of the beef industry. New Mexico Ranch to Rail provides cattle producers with an opportunity to evaluate the productivity and quality of the steer calves they produce and allows producers to get carcass data and a breakeven analysis on each calf entered in the program. Equally important, this program is an educational opportunity for producers to learn about cattle marketing and the feeding and packing sectors of the beef industry. New Mexico State University and Texas A&M University have been cooperating in the New Mexico Ranch to Rail program conducted by Double A Feeders in Union County, New Mexico. The 2003-2004 New Mexico Ranch to Rail program totaled 271 steers entered from New Mexico (194 head from 13 ranches) and Texas (77 head from 7 ranches). Additionally, each year an educational field day has been held to provide producers an opportunity to see their cattle in the feed yard and learn about feedlot operations, fed cattle marketing, and performance. Data from the first four years of the New Mexico Ranch to Rail Program is being compiled and analyzed to evaluate the influence of ranch management factors on performance and profitability of steers entered in the program.

The New Mexico Beef Quality Assurance (BQA) Program is patterned after national guidelines developed and adopted by the National Cattlemen’s Beef Association. The New Mexico BQA program is conducted by the New Mexico Cooperative Extension Service, with the New Mexico Livestock Board serving as a third party certifying agency. In developing the certification program, livestock specialists have been instrumental in the cooperative effort between the New Mexico Cattle Growers Association and New Mexico State University to create a Beef Quality Assurance Task Force (BQATF). The BQATF was established to serve as an advisory board to NMSU regarding future BQA efforts. Specialists annually attend the National Cattlemen’s Beef Association Beef Quality Assurance State Coordinators’ Meetings.

Standardized Performance Analysis (SPA) is a financial and economic software package designed to aid cow-calf producers in evaluating ranch finances and cattle performance relative to other ranching operations. Livestock specialists have coordinated the New Mexico SPA program. The 2004 workshop had 5 participants representing approximately 5000 beef cows. The estimated improvement in net return during the following year, based on the recommendations provided to producers, was $35/head. Over 10 years, this level of improvement would yield more than half a million dollars to these producers, plus any impact the participating producers may have on neighboring beef enterprises.

Beef cattle specialists and county extension agents continue to coordinate the Tucumcari Bull Test and Sale and the Northern New Mexico Bull Test and Sale. These sales are a valuable tool for educating producers in principles of cattle selection, providing an opportunity for purebred producers to evaluate the genetic makeup of their produce, and providing a source of performance tested bulls for commercial producers.

Extension specialists are actively providing educational materials to livestock producers concerning bio-security. Specialists have participated in several planning meetings as well as a statewide workshop for county extension faculty and members of the New Mexico Livestock Board.

In response to concerns from range livestock producers regarding mandatory individual animal identification and the use of electronic identification systems, a demonstration project was initiated in the spring of 2003 at the Corona Range Livestock Research Center. This project will demonstrate the use of electronic individual animal identification of the cow herd and also quantify the rate at which ear tags are lost or rendered non-readable. Electronic identification tags were placed in the ear of all commercial cattle in April of 2003.

c. Source of Federal Funding -Smith Lever 3(b)(c)

d. Scope of Impact - Multi-state Extension (AZ, CO, TX)

Key Theme – Specialty Crop Production and Marketing

a. Description of activity

Many minor vegetable crops are marketed through alternative marketing techniques, so more information is needed on the characteristics of these marketing channels. Most minor vegetable crops and other specialty crops are produced on small farms under sprinkler, furrow or flood irrigation, all of which are relatively inefficient. These growers are concerned about the potential shortages of water for irrigation. The time of unlimited water is past; more efficient methods of irrigation must be implemented and evaluated. More information also is needed on what varieties of herbs and other high value crops are adapted to northern New Mexico.

b. Impacts/accomplishments

The public was made aware of the benefits of growing specialty crops and using drip irrigation and mulch techniques to conserve water (as much as 22.7%) in the production of herbs and other specialty crops through workshops, conferences, tours, field days, newspaper releases, web sites, and newsletters.

c. Source of Federal Funds -Smith Lever 3(b)(c)

d. Scope of Impact -State Specific

Key Theme - Plant Pathology

a. Description of activity

The plant pathology program supports agricultural producers and urban clientele by providing educational programs and diagnostic services for identification of plant disorders. Educational programs are conducted at Master Gardener Classes, Pesticide Applicator Training Workshops, Crop Conferences (vegetables, specialty crops, field crops, and turf and ornamentals), and various public workshops on plant health. Diagnostic services are provided on a formal basis in the Plant Disease Laboratory at New Mexico State University. Plant specimens submitted by county agents, extension specialists, agricultural producers or the general public are evaluated for disease by use of modern laboratory procedures. A diagnosis of the plant problem is made and a formal report is provided to the individual who submitted the problem and to the owner of the plant (if different). Disease diagnosis also is made on an informal basis at plant clinics held throughout the state. At plant clinics, specimens are generally evaluated on site and a diagnosis is made without laboratory analysis and recommendations are provided to the plant owner (if laboratory analysis is required, the specimen is taken to the lab for a formal diagnosis).

b. Impacts/accomplishments

The Extension Plant Pathologist conducted a seed germination experiment in soil amended with broccoli residue. This is preliminary work as part of an overall research project to determine the efficacy of broccoli residue in controlling soil-borne fungal diseases of chile peppers.

Specialists participated in State Survey Committee Meetings, which are designed to evaluate pest problems and potential pest problems in New Mexico and establish a plan for pest surveys in New Mexico, including prioritizing pest problems and funding requests. Specialists also worked with the State Homeland Security officials to develop an agro-security plan for plant pathogens.

c. Source of Federal Funds -Smith Lever 3(b)(c)

d. Scope of Impact – Integrated Research and Extension; Multi-state Research/Extension (with states AK, AZ, CA, ID, MT, NY, OR, WA)

Key Theme—Commercial Vegetable Production and Marketing

a. Description of activity

Commercial vegetable production is an integral part of the overall economy in New Mexico. Chile and onion production and processing are especially important. In 2003, the direct value of all chile crops was $41 million dollars, and the value of the onions grown exceeded $61 million. Yearly contribution to the state's economy greatly exceeds these figures when considering value-added manufacturing, job contributions, and all supporting industries and activities in the state. Many factors are threatening to diminish the commercial vegetable industry in New Mexico. Production costs, especially those related to hand labor, have increased for local growers while the price paid for their product has remained fairly steady. Disease and pest pressures have also severely diminished profit margins for local growers. Water quality and availability has become a limiting factor to production, as growers are forced to pump water from wells to continue their crops. In addition to these production challenges, recognition of New Mexico vegetable crops must also be increased both within the state and nationwide to expand the markets for our crops and thereby increase profit potential for local growers.

b. Impacts/accomplishments

NMSU scientists conducted a mechanical harvest pilot study to determine the feasibility and to anticipate challenges for green chile, and reported on results of red chile mechanical harvest experiments at the International Pepper Conference in Naples Florida, and the New Mexico Chile Pepper Conference. Field trials were conducted and reported for red chile breeding lines and standard control red chile varieties grown during the 2004 season.

Extension personnel visited with commercial growers, industry representatives and county Extension agents from all the major production area in the state; conducted workshops in Sustainable Agriculture for the Southwest to train Extension agents and specialists covering important topics related to sustainable and profitable vegetable production. Extension specialists also composed and presented seminars to children in the 5th grade to teach them about onions, in conjunction with the Kids, Kows, and More program.

c. Source of Federal Funds—Smith Lever 3(b)(c)

d. Scope of Impact—State Specific

Key Theme - Risk Management and Farm/Ranch Management

a. Description of activity

The risk that prices can move enough to cause major economic damage to agricultural producers has long been a significant problem. Likewise in the new era of deregulation, other industries such as finance, utilities, and energy face the same risks that agriculture faces. Tools exist, such as futures, options, and swaps, that can help manage the risks of price changes and thus be helpful to industries. This project looks at each industry and the tools that can help provide economic benefits to those that choose to use them.

b. Impacts/accomplishments

Extension specialists responded to many requests for tax, economic, accounting, lease or custom rate information from producers, lenders, and business people (in addition to cost of production requests). Projected 2004 crop cost and return estimates were developed and released prior to the planting season. The set of cost and return estimates includes 49 representative farms and 4 nontraditional crop situations. The primary economic impact involves improving the decision-making of farmers and ranchers and providing needed input data to the decisions made by lenders, and the analyses of appraisers and economic researchers. Currently, no more than 5% of NM farms and ranches use price risk tools. If the number doubled to 10%, an additional $7 million dollars of net farm income would be generated and at least 70 farms and ranches would be saved from bankruptcy.

c. Source of Federal Funding -Smith Lever 3(b)(c)

d. Scope of Impact -State Specific

Key Theme - Small Farm Viability/Specialty Crops

a. Description of activity

A majority of fruit growers in the State produce on small acreages (less than 10 acres), and find it necessary to obtain off-farm employment to make ends meet economically. Unreliable production of crops currently grown and marketing problems were listed as major reasons for this lack of profitability according to stakeholders (advisory board). Growers have expressed a desire to remain tied to the land, but need help in production and marketing in order to do so. Remaining on the land will help with social problems (family togetherness) and also with food security, preservation of water rights, and preservation of an agricultural heritage.

b. Impacts/accomplishments

Specialists and researchers had excellent harvests of strawberries, raspberries, blackberries, grapes, apples and peaches from the 2.5 acre certified organic plantings made in 2002. The growers who used NMSU recommended "soft" pest control techniques in 2003, again had excellent results in 2004, and several growers were convinced of the advantages.

New wine grapes that were planted in 2004 with our assistance will add over 150 tons of grapes to local wineries in the near future. These wineries currently obtain grapes from southern New Mexico or from out of state. A tree fruit grower who planted an acre of peaches in 2002, specifically following NMSU recommendations, harvested over 400 boxes (8000 lbs) of peaches in 2004. These peaches were easily sold to one retail outlet in Santa Fe at prices higher than forecast. Next year his apples planted in 2003 will begin production.

A berry grower who planted 6000 strawberry plants in 2002, again following NMSU recommendations, harvested $15,000 worth of berries in 2003, and from the same plants, harvested over $30,000 worth in 2004. These all were sold at local farmers markets. Several other growers have planted or will plant berries in 2005.

c. Source of Federal Funding -Smith Lever 3(b)(c)

d. Scope of Impact--Integrated Research and Extension

Key Theme - Small Farm Task Force

a. Description of activity

The Small Farm Task Force/RAIPAP is a project of the New Mexico State University Cooperative Extension Service. This project presents a holistic approach through its intended goals, to provide the essential resources required for empowerment that would sustain rural family life. This is accomplished by training the local residents to carry out rural development that will improve the quality of life and increase economic opportunities in their communities.

b. Impacts/accomplishments

Specialists continue to assist La Jicarita Enterprise Community in their agriculture and natural resource programs, advising on funding projects and assisting in developing for-profit and non-profit business opportunities.

Specialists continue to gather up-to-date policy issues from the spectrum of the news media, federal and state agencies, community based organizations and others to keep community, county and state leaders informed on these emerging issues. More than 50 community leaders are informed with these bi-monthly mail outs.

Specialists actively working with a state-wide policy committee that identifies policy related to agriculture and food and, through legislation and education, strive to bring consensus to state perception of agriculture. A specialist serves on a subcommittee that relates to cultural and historical land use.

c. Source of Federal Funding -Smith Lever 3(b)(c)

d. Scope of Impact – Integrated Research and Extension

Key Theme - Urban Horticulture

a. Description of activity

Although New Mexico's population is almost 3/4 urban, most home garden and landscape problems for rural citizens are identical to those of urban residents. Other than home gardening, urban residents have little contact with agriculture or NMSU and get their horticultural information through local nurseries. Gardening is a major means of relaxation and important as a fresh food supplement for citizens. Questionnaires have shown that though the primary source of information is the nursery, the most reliable source is perceived by the public to be the Extension Service and Extension Service volunteers such as Master Gardeners. In New Mexico, concerns over water conservation linked to a desire to maintain attractive landscapes, has increased the need and desire for reliable, research based, water conserving gardening information. Commercial and institutional landscapes and professional landscape managers are aspects of New Mexico's agriculture.

b. Impacts/accomplishments

The Extension Urban Horticulturalist coordinated State Master Gardener Program, authored chapters in and provided content oversight for the New Mexico Master Gardener Manual, taught Master Gardener classes during the initial training period and provided up to date and advanced training to Master Gardeners throughout the year.

The Extension Urban Horticulturalist reintroduced the concept of olla irrigation to New Mexico gardeners while encouraging experimentation by gardeners and researchers to develop modern adaptations of olla irrigation for water conservation in New Mexico gardens and landscapes. This was accomplished by installing demonstration olla planting at the Santa Fe County Extension office for Master Gardener Conference, initiating collaboration with the Agricultural Science Center at Farmington to implement olla irrigation research and demonstration for xeriscapes, and installing a demonstration olla garden in association with the Xeriscape Council of New Mexico.

The Horticulturalist assisted and advised County Extension Agents regarding problem diagnosis and program development/presentation regarding landscape horticulture in their counties.

c. Source of Federal Funding – Smith Lever 3(b)(c)

d. Scope of Impact – State Specific

Goal 2: A safe and secure food and fiber system.

Overview

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.

The New Mexico Agricultural Experiment Station and Cooperative Extension Service believe that they are meeting the short-term goals outlined under Goal 2 in the 5-year Plan of Work submitted in July 1999.

Total expenditures for Goal 2 were $10,303 from Hatch Act funds. The number of full-time equivalents engaged in research for this goal was 0.45 FTE.

Total expenditures for Goal 2 were $46,421 from Smith-Lever Act 3(b)(c) appropriated funds. The number of state-level full-time equivalents engaged for this goal was 0.8 FTE.

1. Agricultural Experiment Station

Key Theme – Food Handling

a. Description of activity:

Major objectives of the food technology program are promotion of regulatory compliance, product process development, food safety and sanitation, and marketing of specialty food products Value-added food processing is beginning to generate a

significant number of jobs in New Mexico. Small farmers are raising more specialty crops, which leads to unique food products. Specialty foods cover a wide range of products from pepper jelly to beef jerky, salsa, and aged blanc goat cheese. With Hispanic foods having an impact in mainstream America (Hollingsworth, 2003), consumer demand for New Mexico specialty food products will only increase.

Specialty crops that small farmers can grow and add value to are being studied to determine handling needs. These efforts will lead to improved food quality, food safety, and saleable yields of fresh and processed foods. Application of a Hazard Analysis Critical Control Point (HACCP) type model is being tested to analyze each process from the "farm to the table." Control points are being identified and monitoring methods developed. Educational materials (videos and website development) to supplement growing practices are also being developed to extend the education from research to farmer. Good Agriculture Practices (GAPs) are being tested to recycle by-products in crops such as chile.

b. Impacts/accomplishments

- A collaborative USDA grant with Cornell University allows for programming towards specialty crop producers has been extended through the year 2005. An FDA required course, Better Process Control School has been coordinated and presented three times this year in NM providing a valuable service to southwestern states as well as northern Mexico. This course taught in Spanish May 2004, brought processors from Peru, El Salvador, Puerto Rico, Mexico, New Mexico, Texas and Arizona. The Food Industry Seminar has brought prominent food scientists to present new and innovative food science concepts to the region. Additionally these scientists interact with students and one on one with food processors discussing their issues and concerns with the food industry.

- Initial efforts are to characterize the fermentation process of fresh red cayenne pepper as processed in the production facility. This is the first study to evaluate this process. The fermentation of chile pepper mash is highly complex and affected by many variables. This is a natural process that currently has few controls. If this process can be fully characterized, then controls can be put into place to ensure a safe and uniform product.

- Educational materials production has been completed and field-tested. Plans are underway for distribution and use in the field during the next six months Key personnel have conducted instructional design assessments on content for the website, and are developing plans for distribution and promotion. Currently web site development is on track, and project directors are meeting monthly to provide content. A video teaching Good Agricultural Practices (GAP) has been completed. The video consists of four segments illustrating proper minimally processed fruits and vegetables: --The Motivation --Decision to start --Worker Hygiene --Crop Protection Agents A video, entitled 'Closing the GAPs: Utilizing Agricultural Practices' has been developed.

- Preliminary data has been collected on pectin content and microbial quality of fermented chile mash. This data indicates that insoluble solids may have a bigger impact on final

product quality than soluble solids such as pectin. The microbial profile of this product is complex and will take time to fully characterize.

- Evaluation of food production from application of Good Agriculture Practices on the farm operation to HACCP in processing facilities allows for a holistic approach that will ensure food safety. Once food safety programs are adopted, then process control and streamlining of production facilities can be accomplished. Improving operational efficiency allows for economic competitiveness in a global market.

c. Source of Federal Funds – Hatch

d. Scope of Impact – multi-state and international

Key Theme - Food Safety

a. Description of activity

Fresh chile and chile-based products such as enchilada sauce have a relatively short shelf-life so consumers must use some form of preservation to extend their availability. One method consumers use to preserve chile products at home is canning. The choice of whether to use water bath canning or pressure canning is dictated primarily by the pH of the product being preserved. Since water bath canning is used more extensively than pressure canning in New Mexico, formulation of chile products appropriate for home preservation using the water bath canning method is important. The major impact from this research could be a reduction in the risk of foodborne illness from improperly home canned food products.

Foodborne illness is a rising concern. To address the food safety issues in New Mexico, consumers, restaurant and food service managers and staff are targeted with Extension education programs. These programs emphasize: keeping hands and surfaces clean, preventing cross-contamination, cooking and processing at proper temperatures and chilling foods promptly and properly.

b. Impacts/accomplishments

- The fermentation of chile pepper mash is highly complex and affected by many variables. This is a natural process that currently has few controls. If this process can be fully characterized, then controls can be put into place to ensure a safe and uniform product. Funding this project will ensure that new and safe techniques are fully utilized in a food process that is vital to New Mexico.

- It is likely that chile is grown in every county in New Mexico, whether it is in back yard gardens or in fields harvested for commercial uses. Updated and more complete nutritional information and handling recommendations will affect anyone who consumes chile.
- Results from 0, 5, 30, 60, 90 and 180 day tests and storage indicate that there is a very limited risk of food-borne illness from improperly home canned chile products.

- Over 3,600 food safety contacts were made by Extension faculty in 2003, either in person or on the phone. In addition, thousands more were reached with research-based nutrition information via Extension newsletters, local newspaper, radio and TV stories and other media outlets. One special project included the use of the bilingual (English/Spanish) curriculum, "The Safe Food Trail: Adventures of Will Cook", in training with food service employees. It was used to provide work training for Welfare to Work participants entering the food service industry.

c. Source of Federal Funding -Smith Lever 3(b)(c)

d. Scope of Impact – Integrated Research and Extension, State specific

2. Cooperative Extension Service

Key Theme - Food Safety

a. Description of Activities

The development of the interactive, bilingual CD-ROM, Food Detectives Fight BAC! has been finalized and beta testing was conducted in New Mexico and Missouri, with Missouri addressing the national testing requirements as set by the USDA Food Safety Education Program. Missouri is also making recommendations on channels for national distribution.

Those most susceptible to serious consequences or even death due to food-borne illness are infants, young children and the elderly. Yet, these individuals often have the least control over the food they eat. Extension food safety education is targeted at consumers, care takers of infants, young children and the elderly, food service and restaurants workers and managers.

To be effective, food safety education in New Mexico must address diversity in language, culture, level of literacy, and audience needs. The NMSU CES has developed teaching materials for English, Spanish and Navajo speaking people. A variety of approaches have been developed to reach specific at-risk groups.

b. Impacts/accomplishments

- The materials for take-home and hands-on Extension activities are available via the Web and CD. Once finalization and bug testing is completed, the CD-ROM will be distributed nationally in 2005. Games are available online at http://www.fooddetectives.org and http://www.fooddetectives.com.
- Adoption of safe food handling practices; food preservation; and understanding food safety risks are evaluated in at least 50% of all clientele trainings. Repeated assessments average a 58.32% knowledge gain and a 49.5% attitude change over the course of this past year and over 1652 evaluations completed.

- Approximately 20 Master Food Preserver volunteers are trained annually to provide information to the public on home food preservation and safety. They each return a minimum of 40 hours of service valued at $11,200. Volunteer service hours have mainly included presenting workshops, answering preservation calls, and passing out preservation information at health fairs.

- Educational materials have been developed for the food processing and food service industry. Materials for small-volume, independent food processors in New Mexico include English/Spanish videos on processing salsa, making beef jerky and HACCP. By providing regional examples, these materials enhance educational programs and increase their relevance to the New Mexico Food Industry. Regular workshops in New Mexico food processing centers provide hands-on training opportunities for small food processors, further stressing the importance of food safety. An English/Spanish flip chart that uses a cartoon story to teach food safety to food service workers is also being used.
- Consumer food safety education takes place on a number of fronts. The Home Child Care Providers' Food Safety Program was created for Spanish-speaking home day care providers. The Walk in Beauty video series, which was filmed on the Navajo Nation, addresses situations specific to the Navajo people. Fight BAC!™ videos for adults and youth are being developed in English, Spanish and Navajo. Paraprofessional educators with the Extension Food and Nutrition Education Program (EFNEP) teach with the Long Live la Familia video series. These bilingual soap opera videos encourage participants to reflect on, discuss and change their nutrition and food safety behaviors.

c. Source of Federal Funds – Smith-Lever 3(b)(c)

d. Scope of Impact – Integrated research and extension, multi-state (CO)

Goal 3: A healthy, well-nourished population.

Overview

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. 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 State 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.

The New Mexico Agricultural Experiment Station and Cooperative Extension Service believe that they are meeting the short-term goals outlined under Goal 3 in the 5-year Plan of Work submitted in July 1999.

Total expenditures for Goal 3 were $12,500 from Hatch Act funds. The number of full-time equivalents engaged in research for this goal was 0.85 FTE.

Total expenditures for Goal 3 were $177,407 from Smith-Lever 3(b)(c) Act funds. The number of full-time equivalents engaged in activities for this goal was 3.0 FTE.

1. Agricultural Experiment Station

Key Theme – Human Nutrition

a. Description of activity

National data indicate that the average calcium intake among adolescents is less than desirable during a period when the greatest amount of bone accumulation is occurring. Although some programs have been initiated to redirect the trend in calcium intake, interventions that involve parents would likely enhance the outcomes of these newly

developed programs. According to the Healthy People 2010 Objectives Report, 46% of persons age two years and older were at or above the calcium recommendations at baseline measurement and the target for 2010 is 75%. Therefore, the goal of this proposal will help improve the chances of our nation reaching the national objectives regarding calcium intake.

The rates of overweight childhood have doubled in children 6-11 years old and tripled in children 12-19 years old in the past 20 years. This means that 15% of children who are ages 6 to 19 years old are overweight and at risk for becoming obese. Childhood obesity is a health condition that tends to continue into adulthood. Health risks associated with obesity in adults include cardiovascular disease, diabetes, hypertension, and many others. Childhood obesity has the immediate risk of developing type 2 diabetes in adolescence. Obese children also have lower quality of life and psycho social factors such as self esteem. The personal and societal cost of obesity in children in New Mexico and adult citizens in New Mexico is great. A goal of this project is to collect baseline data on the nutritional status, anthropometric measurements, and physical activity levels in a sample of New Mexico children before and after participating in the I CAN "Eat Smart. Play Hard" program.

b. Impacts/accomplishments

- The researcher is working the Las Cruces public schools and the Dona Ana County Cooperative Extension Service. Data will be collect in spring 2005 at the Tombaugh Elementary School.

- This research has allowed a deeper understanding of and appreciation for diversity. Most studies on calcium intake have failed to address ethnic differences. This has led to under reporting and a "one approach fits all" to educational efforts. This phase of the research allows scientists to focus on the person inside the household who purchases, prepares and serves the food to be consumed by teens. Results indicated that all participants interviewed in New Mexico were shocked at the amount of calcium needed each day. Most did not know what children were eating, especially those that were taken care of part of the day by relatives and those children that had to prepare their own food. Persons of Latino background had limited knowledge about foods other than those consumed in their culture. All those interviewed wanted more information about how to get more calcium in the diet.

c. Source of Federal Funds — Hatch

d. Scope of Impact — Multi-state research
With states, AZ, CA, CO, HI, ID, IN, KS, MA, MI, MT, NE, NV, OR, UT, WA, WY

2. Cooperative Extension Service

Key Theme – Birth Weight

a. Description of activity

The CYFAR program sponsors the Lea County Home Visitation Community Project. In Lea County, personal profiles of participants in the Home Visitation Program reflect a number of risk factors for potential child abuse and neglect, such as isolation, limited social support network, limited education and income, and in some cases being young at the time of the baby's birth. These risk factors do not predict that child abuse will always occur, but research has shown that parenting skills education has been associated with the reduction of child abuse and neglect in similar types of audiences. In the Home Visitation Program, participants are visited by a Registered Nurse, provided education on child care and development, as well as given much needed social support in their new roles as mothers.

b. Impacts/accomplishments

Twelve females enrolled in the Home Visitation Program and 7 graduated from the program in June 2004 in a formal ceremony at the County Extension Office. This was a 58% completion rate. Based on interviews of 7 participants who completed the home visitation program, 100% of clients met goals they set for themselves at the onset of the program. One participant set a goal at the onset of the program which was to obtain a degree as a registered nurse. She is currently in a nursing program and will obtain her degree in 2005. Another participant set a goal to speak and understand English; she now can speak and understand English and has decided to go to school to use her English language. Other goals of participants related to being a better mom, taking children to swimming lessons, having children learn a musical instrument, creating a better life. Although these goals are difficult to measure, they are indicators of a desire to improve their lives and the lives of their children.

c. Source of Federal Funds – Smith-Lever3(b)(c)

d. Scope of Activities – State Specific

Key Theme – Health Care

a. Description of activity

In Grant County all 3rd graders in the county's 3 school districts received training on sanitation and hand washing. Approximately 400 youth received "The Germ Detective Program."

b. Impacts/accomplishments

Teachers evaluated the program as very much needed because hand washing is the number one deterrent to spreading germs and disease, particularly in a school environment. One teacher commented that after the program she saw girls using the backs of their arms to obtain paper towels so that they did not have to touch the plastic dispenser which might contaminate their clean hands.

c. Source of Federal Funds – Smith-Lever3(b)(c)

d. Scope of Activities – State Specific

Key Theme – Human Health

a. Description of activity

Colfax County Caring for Children Project. In Colfax County, six child care provider capacity building workshops were held and offered 45 participants 18 hours of continuing education that they can use to keep their jobs as child care providers. In the first workshop, 5 child care providers received education on story telling through puppetry.

In New Mexico in 2002, an estimated 120,555 persons had diabetes. Approximately 1 in 12 adults in New Mexico has diabetes. Approximately 1,662 children in New Mexico have diabetes (Type 1 and Type 2). Among persons 18 years and older in New Mexico, 6.2% had diagnosed diabetes. Diabetes related complications result in blindness, lower extremity amputations and end stage renal disease. In 2000, in New Mexico, there were 304 new cases of end stage renal disease that required dialysis. A total of 1,208 patients with diabetes were on dialysis. There were 307 limb amputations due to diabetes. In 2000, there were 18,435 diabetes related hospitalizations in New Mexico, 5,668, of which were for cardiovascular disease. Diabetes was the 6th leading cause of death in New Mexico in 2001. Diabetes was the primary cause of death of 552 deaths and contributed to an additional 582 deaths. The direct cost (medical care) and indirect cost (lost productivity and premature death) of diabetes in New Mexico in 2001 totaled almost $0.9 billion.

Health is not merely the absence of disease but is a state of complete physical, mental and social well-being (World Health Organization). The health of an individual and of a family is directly connected to quality of life. A goal of Extension is to promote quality of life. Thus, a Family Health and Wellness program within Extension contributes to Extension's mission. The Family Health & Wellness (FHW) program aligns with the Healthy People…Healthy Communities (HPHC) national initiative of the USDA Cooperative State Research Education & Extension Service to promote the capacity of individuals, families, and communities to increase healthy behaviors and lifestyle choices and make informed consumer decisions.

b. Impacts/accomplishments

- Based on a 5 point perceived change in knowledge rating scale, participants improved their knowledge from pre to post an average of 2 percentage points in all workshops. Topics included CPR and First Aid, natural health care for the caregivers, child abuse identification and prevention, and special needs childrens' issues. Additional workshops or one-on-one consultations were provided by the CYFAR Program Assistant to 21 providers on individual topics determined by the provider. Follow up personal interviews of 19 program participants was conducted several months after the initial training in the 6 workshops previously described. This group of participants stated that the workshop training provided quality up-to-date information and they would recommend the workshops to other providers. The CYFAR project allowed for quality speakers and workshops that may not have been otherwise provided.

- Diabetes classes teach about five important tests that tell a person how well their diabetes care is working. The tests are A1c, blood pressure, microalbumin (urine) test, LDL cholesterol test and eye exam. Participants are given the opportunity to have 3 or 4 of the tests completed and learn what their test results are. They learn what the goal of each test is and some things that they can do to improve their test results, if the result is out of range. Education is the key to helping New Mexicans prevent or control diabetes with regular physical activity and a balanced, nutritious diet. Twenty-five NM counties have provided diabetes education over the past two years. Diabetes education in New Mexico is accomplished using a variety of methods. The Extension Diabetes Coordinator is Certified Diabetes Educator and a Registered Dietitian. The Extension Diabetes Coordinator and the Food and Nutrition Specialist serve as resources to and provide training to Extension Home Economists in subject matter and serve as a liaison between Cooperative Extension Service and other agencies and organizations.

- To date, the Health Topic Training/Resource Need Survey has been used to assess Training/Resource needs of county Home Economists. Surveys were completed in early 2004. The top ten identified topics were: Adult Overweight/Obesity, Nutrition, Youth Overweight / Obesity, Adult Diabetes Prevention & Control, Youth Diabetes Prevention & Control, Adult Fitness / Physical Activity Youth Fitness / Physical Activity, Stress Management, Heart Disease, and Osteoporosis.

c. Source of Federal Funds – Smith-Lever3(b)(c)

d. Scope of Activities – Multi-state
With states AL, AZ, CA, CO, HI, IN, KY, MI, MN, OR, WA, WY

Key Theme – Human Nutrition

a. Description of activity

El Regalo de Salud (The Gift of Health) is a public education radio campaign targeted at Spanish-speaking parents. The purpose of the campaign is to help parents address their

children's weight, nutrition, and physical activity in positive and culturally-appropriate ways.

Sixty-three radio capsules are being developed to include meal planning, celebrations, family mealtime, snacks, and physical activity. Each radio spot will reference a toll-free phone number that will be staffed by a Spanish-speaking operator.

b. Impacts/accomplishments

- To date, five pilot radio capsules have been produced. These pilot capsules focus on several different topics and utilize a variety of formats (interview with an expert, interview with a parent, dialogue between actors, straight narration). The capsules have been pilot tested by Spanish-speaking communications experts in San Antonio, Houston, Miami, Phoenix, and Los Angeles. The final focus groups will take place in Chicago. In each city, local Extension Service agents and FSNE/EFNEP employees have set up two to three focus groups with Spanish-speaking parents and service providers. Focus group participants listen to each capsule, fill out a short survey about the capsule, and then participate in a group discussion about the capsule. Feedback about the relevance of the capsules to the participants' cultures, traditions, and life experiences has been especially helpful, as well as suggestions for how to appeal to all Hispanic cultural groups while including specific cultural references.

c. Source of Federal Funds – Smith-Lever3(b)(c)

d. Scope of Activities – Multi-state
With states AZ, CA, FL, TX

Key Theme – Infant Mortality

a. Description of activity

In Grant County, the Extension 4-H and Home Economist conducted a birth defects prevention educational program for 170 ninth graders.

b. Impacts/accomplishments

A comparison of pre and post test scores showed that respondents improved their knowledge scores from 23% to 79%. The number of clientele who will begin taking a multivitamin with folic acid also increased from 23% who said they took a vitamin every day to 90% who said they would start taking a vitamin as a result of the program.

c. Source of Federal Funds – Smith-Lever3(b)(c)

d. Scope of Activities – State Specific

Key Theme – Food Accessibility & Affordability

a. Description of activity

New Mexicans need educational programs on good nutrition and healthy living. However, English-only tapes will not fill the needs of our multicultural population. Therefore, over 50 multilingual video and computer-based educational programs have been prepared over the past five years to be used by the Cooperative Extension Service and cooperating agencies. Most of these materials are in both English and Spanish; some are available in Navajo. A few programs are available only in Spanish or in a mixed Spanish/English presentation.

b. Impacts/accomplishments

Over 50 video tapes and interactive programs have been produced since the program began. Videos and computer programs are evaluated for effectiveness with the target populations; consumers report they enjoy using the programs in their native language. Program participants report that learning good nutrition practices in a person's native language helps clientele understand differences in cultural food practices and why eating certain foods in recommended amounts can improve a person's health. Furthermore, a majority of targeted audiences reported plans to improve their nutrition and food safety practices as a result of watching the videos or using the computer programs.

c. Source of Federal Funding -Smith Lever 3(b)(c)

d. Scope of Impact – Integrated Research and Extension

Key Theme - Food Handling

a. Description of activity

The value of New Mexico's agricultural food products are being significantly increased through food processing business development. Small farmers, which comprise a majority of NM farmers, are raising more and more specialty crops (as presented under Goal 1) that can lend themselves to unique food products. Value-added food processing is just beginning to generate a significant number of jobs and a return on economic investment. The program objectives are 1) to provide food processors programs on how to produce safe food products, 2) teach state and federal regulations pertaining to food products, 3) assist in developing and maintaining compliance with all food regulations and 4) assist in the establishment of food processing incubators and 5) teach food handling and safety, with particular emphasis on restaurants and tourism facilities. The Food Technology Specialist, three Home Economists and seven nutrition assistants have been directly involved with teaching workshops and handling questions.

The planning and design of the Extension Food Product Development Laboratory has been completed. The Lab will be a testing lab as well as a demonstration, product

analysis and teaching facility. Several pieces of equipment have been purchased as well as design plans for sensory testing booths within the same laboratory space. This project has taken longer than expected because of some unforeseen physical limitation within Gerald Thomas Hall requiring relocation of the laboratory.

b. Impacts/accomplishments

- Extension specialists have helped to establish food processing facilities within business incubators located in Questa, Canjillon and Albuquerque after having helped oversee the development of the Taos County Economic Development Corporation (a model food processing facility). Workshops in food processing in the three communities in nutrition, food safety and consumer food preparation have seen seven new value added products become viable business ventures in the past two years with the possibility of fourteen more products in stages of commercial development. It is estimated that the seven products already on the market are employing twelve people on a part time or full time basis. One of the seven businesses has reported a net profit from sales.

- The fee based services provided in the Food Product Development Laboratory include development of graphic "Nutritional Panel" food product labels (3-5 requests/mo), the "Process Authority" review of procedures, ingredients and distribution methods for acidified food products (3-5requests/mo), and microbial and chemical analysis - sodium content, microbial shelf-life, and water activity (3-4 requests/mo).

c. Source of Federal Funding -Smith Lever 3(b)(c)

d. Scope of Impact – Integrated research and extension, multi-state (AZ, TX, CO, UT)

Key Theme – Food Resource Management

a. Description of activity

The Extension specialist and nutrition educators promote the understanding of the relationship between diet and health, nutrition research findings and making healthy food choices. Nutrition education is implemented in a very practical manner. Demonstrations are conducted on healthy food preparation including lowering of fat, salt and sugar in the diet and increasing grain, vegetable and fruit intake as appropriate for dietary concerns related to health. Often, participants are engaged in hands-on activities that build their own skills. In addition, counties identify resources to address conditions that affect health and well-being and cooperate with other agencies to deliver appropriate nutrition services.

b. Impacts/accomplishments

- 97.6% of individuals receiving nutrition education planned to adopt at least one recommended dietary change, 92% planned to become better consumer shoppers, and 76% planned to choose moderate portion sizes (12,110 surveyed).

- Evaluations recorded end use plans of participants to change behavior and post surveys to determine the actual change in behavior of participants. Results from diabetes education programs included a 50% increase in the number of participants who planned to follow a meal pattern to control diabetes; a 72% increase in the number of participants who planned to use the Food Guide Pyramid when preparing meals and exercise at least 60 minutes a week as compared with the number doing these things regularly before attending the workshop (based on 4,329 evaluations).

- Post survey results based on 3251 participants three months after attending diabetes education programs, report regularly measuring food portions; 30% report regularly checking their feet for sores, cuts or blisters daily, 32% report getting their kidneys checked regularly; 44% report making decisions with their health care provider to better manage their diabetes; and 64% report getting their hemoglobin A1c checked regularly.

c. Source of Federal Funds – Smith-Lever 3(b)(c)

d. Scope of Impact – Integrated research and extension, multi-state (AZ)

Goal 4: Greater harmony between agriculture and the environment.

Overview

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.

The New Mexico Agricultural Experiment Station and Cooperative Extension Service believe that they are meeting the short-term goals outlined under Goal 4 in the 5-year Plan of Work submitted in July 1999.

Total expenditures for Goal 4 were $351,660 from Hatch and McIntire-Stennis Act appropriated funds. The number of full-time equivalents engaged in research for this goal was 28.96 FTE.

Total expenditures for Goal 4 were $265,633 from Smith-Lever Act 3(b)(c) appropriated funds. The number of state-level full-time equivalents engaged in activities for this goal was 12.36 FTE.

1. Agricultural Experiment Station

Key Theme – Agricultural Waste Management

a. Description of activity

This program continues to evaluate the long-term effects of organic amendment misuse that would increase the likelihood of groundwater and surface water contamination. In studying soil salinity and fertilizer interactions, researchers hope to decrease the over-application of fertilizers and thus reduce groundwater contamination by nitrates. Improving soil quality directly translates to the improved capacity of a soil to store wastes including radioactive, toxic, and biohazard. Better soils will release fewer toxins to the atmosphere, groundwater, and plants or animals living in the soil. Food quality will improve along with the quality of soil.

b. Impacts/accomplishments

Researchers continued greenhouse studies to compare the effects of liquid organic and inorganic fertilizers on chile growth, quality, and yield. Appropriate preservation of soil and wastewater samples is an issue in field studies. Cooperative research in salinity and sodicity effects on a variety of crops and soil properties also continued. Characterization of mineral weathering products from mining and military applications in arid zones has an important impact on soil and environmental quality as well as security issues. We found that copper mine tailings were not effective as a potential iron fertilizer in calcareous arid zone soils. Under current site conditions the mobility and health risks of the uranium are minimal.

c. Source of Federal Funds — Hatch

d. Scope of Federal Impact — State Specific

Key Theme – Biodiversity

a. Description of activity

This research program deals with various methods for characterizing the ecological and environmental risks posed by invasive species. The focus of the project is on quantitative methods, usually implemented as computer simulation models. These models typically include some description of the spatial dynamics of the population(s) involved, as well as the temporal dynamics.

b. Impacts/accomplishments

- The study of black-tailed prairie dogs is in its third season and scientists have used mark-recapture methods to estimate survival, reproduction, and population size of six reintroduced colonies. During the second field season (2004) they expanded the project and included four additional colonies. Researchers also have estimated field metabolic rates from numerous adult prairie dogs at three colonies during both the breeding and non-breeding seasons, have collected behavioral data during the breeding season, obtained tissue samples for genetic analysis, and determined water and caloric content of three principal forage species.

- For the Big Bend project, researchers have completed all four scoping meetings, have finished draft reports for each, completed a draft bibliography, and have completed drafts of our risk-analysis models. This project has been expanded to include plants.

- The project on native, exotic and sportfish at Elephant Butte Lake is currently in its second year. Scientists have sampled several sites within the reservoir for plankton, fish and environmental conditions.

c. Source of Federal Funds — Hatch

d. Scope of Impact — State Specific

Key Theme – Biological Control

a. Description of activity

Exotic invasive weeds continue to degrade New Mexico rangelands and riparian areas. Integrating biological control with more traditional control measures such as mechanical and chemical control can provide significantly more stability to a weed control program. This research program assesses the effectiveness of biological control agents in New Mexico environments.

b. Impacts/accomplishments

- Research progressed on several exotic biological control agents including the introduction of three new exotic insects in New Mexico during 2004. Two new exotic biological control agents, the weevils *Eustenopus villosus* and *Larinus curtus*, for Yellow starthistle (*Centaurea solstitialis* L.) were released just south of Cliff on the largest population of yellow starthistle in NM. Initial plant densities were recorded for baseline data. Leafy spurge (*Euphorbia esula*) plots established in 2000 near Angelfire have produced an excellent field insectary of *Aphthona* flea beetles for New Mexico. Leafy spurge has been dramatically reduced at the site and beetle populations have suppressed leafy spurge expansion in the immediate area. Five hundred thousand beetles were removed from this site and released at newly located leafy spurge populations in 2004.

c. Source of Federal Funds — Hatch

d. Scope of Impact — Multi-state Research
AS, AZ, CA, CO, GU, HI, ID, KS, MT, NJ, NY, ND, OR, UT, WA

Key Theme – Forest Resource Management

a. Description of activity

This McIntire-Stennis research program addresses the issues and problems associated with forestation and plant restoration ecology in New Mexico. Along with this effort, the program attempts to quantify underlying variability of individual species to cultural treatments so as to develop more robust propagation strategies for these species. Species selection for research is usually associated with need for the species for specific forestation or restoration projects. Another project explores the response of woodland areas to different types of management to enable grass production and woodland products to be maximized over time.

b. Impacts/accomplishments

- Progress has been made on refining previous developments in effective propagation protocols for woody plant species which can be used in disturbed land restoration/rehabilitation. Further, work has continued on identifying plant species adapted to high elevation (greater than 2,500 m) disturbances. Applied work also involved refining asexual propagation techniques for use in preserving historically significant trees, specifically *Populus deltoids* individuals associated with the Fort Sumner State Monument. Research was initiated that is examining the influence of cover soil thickness on post-planting root development. Also, further work was performed on preliminary trials examining the above- and below ground carbon distribution in pinon-juniper woodlands. Eventually, this information will be used to parameterize and assess carbon cycling models developed for other, related ecosystems.

- The environmental impacts of this research include developing more efficient reclamation/restoration/ revegetation practices and providing the necessary tools (plants) and techniques to improve reclamation success. The increasing occurrence of stand replacing fires in southwestern forests further emphasizes the need to have both the plant material and technologies to mitigate fire effects and rehabilitate these sites. In terms of the pinon-juniper ecology research, the work performed here will assist land managers in their land management activities by reducing any environmental impacts. In terms of the horticultural nursery industry, the use of native plants is a well known aspect of a water conserving landscape.

c. Source of Federal Funds — McIntire-Stennis

d. Scope of Impact — State Specific

Key Theme – Integrated Pest Management

a. Description of activity

Integrated Pest Management (IPM) promotes minimized pesticide use, enhanced environmental stewardship, and sustainable systems. This is achieved by protection of commodities, homes, and communities with environmentally and economically sound practices that result in abundant, high quality supplies of food and fiber products and improved quality of life. Research at New Mexico State University was conducted in various areas of IPM.

b. Impacts/accomplishments

- In the last few years NMSU scientist have expanded from cotton to other important New Mexico crops including alfalfa. Saving one insecticide application on 300,000 acres of alfalfa would save NM farmers $6 million per year. If just 10% of the acreage were spared an insecticide application the savings still would be $600,000 per year. There

would be additional impact from the added value of higher yields. The primary insect pest of alfalfa is alfalfa weevil. Although USDA did releases of parasitoids in the 1980s we did not know if those parasitoids releases were successfully controlling alfalfa weevil in New Mexico. For the past three years researchers have been sampling alfalfa weevil in New Mexico and rearing out parasitoids to determine parasitoid success. They have found that parasitism rates are very variable in New Mexico. For example in the Mesilla Valley we consistently found two species of parasitoids, which produce about 50% control. Insecticides are rarely used. In the middle Rio Grande Valley, typically there is about 5% control and generally only one species of parasitoid. In that area alfalfa weevil is a very serious problem. Determining which areas are good candidates for reintroduction of parasitoids is the first step. With this information researchers and Extension specialists can go to farmer association to discuss reintroductions that could result in better establishment and control by the parasitoids that have been so successful in the Mesilla Valley.

- Hairy vetch has a large assemblage of parasitoids and predators and it fixes nitrogen. Hairy vetch is the best ground cover for pecans tested so far; however, a single row of corn planted throughout the season between pecan trees also provided a large complex of beneficial insects for the control of pecan pest insects.

- Studies continue monitoring the seasonal activity, dispersal, and management of stable flies in New Mexico dairies. Arthropod pest of livestock pose a threat to the health, well-being and productivity of animals. Direct losses to the livestock industry due to arthropod pests are estimated to be more than $3.5 billion annually. These losses include reduced milk production, weight gains, feed efficiency, hide and wool quality, increased transmission of diseases and death.

- Researchers examined the effects of insecticide resistance on selected fitness parameters of the horn fly were examined. Two identical horn fly colonies were established on steers in screened barns. One colony was continuously selected with insecticides and significant resistance was developed in approximately three months. Induction into diapause and spring eclosion of diapausing flies was compared. A higher proportion of resistant horn flies entered diapause, but a smaller proportion eclosed the following spring. Also, resistant flies maintained >20-fold resistance level through diapause.

- Production costs, water needs, phytophagous insect density, N2, yield and profit can be predicted at the field site using a Fast Agricultural Response Monitoring System (FARMS) developed at NMSU. The FARM system uses IR stress sensors to determine water and N2 needs, computer generated pattern recognition techniques to quickly identify insects electronically, and the Cotman (TM) model to predict quality and yield from input data. Operational costs for the FARM system can be offset by savings from reduced inputs. In addition, the chance of inducing secondary insect outbreaks, resistance and human exposure to chemical insecticides will be eliminated. Biological control and organic production are natural extensions of this system. Although not all of the cotton acreage in New Mexico, and the South West will be converted to precision management practices, many will. Improving analytical tools will move the process along. Many of the techniques employed here can be applied to other cropping systems.

c. Source of Federal Funds — Hatch

d. Scope of Impact — Multi-state Research

(with States AL, AR, AS, AZ, CA, CO, FL, GA, GU, HI, IA, ID, KS, KY, LA, MN, MT, ND, NE, NJ, NY, OR, TN, TX, UT, VA, VI, WA, WY)

Key Theme – Nutrient Management

a. Description of activity

The purpose of this research program is to follow the fate of nitrogen fertilizer applied to pecan trees during the kernel fill period.

b. Impacts/accomplishments

A special, non-radioactive isotope of nitrogen fertilizer was applied to a commercial pecan orchard and the nitrogen followed in the tree, soil, and nuts. After 1 year in the field, considerable decomposition of the woody material had occurred. Little or no nitrogen mineralization occurred with the application of high rates of pecan trimmings. The addition these high rates of organic matter had little or no influence on the soil moisture holding capacity or bulk density. With more efficient use of nitrogen fertilizer, farmers may save money and reduce the fluctuation in yield between on and off years. Nitrogen fertilizer added during the kernel fill stage helps to prepare the tree for the next season’s production. An economical disposal method for the woody trimmings of pecans is needed because burning causes air pollution problems. Shredding of woody trimmings and incorporation into the orchard is an alternative method of disposal that appears to have no negative impact on soil properties. With more efficient use of nitrogen fertilizer, farmers may save money and reduce the fluctuation in yield between on and off years. Nitrogen fertilizer added during the kernel fill stage helps to prepare the tree for the next season's production. An economical disposal method for the woody trimmings of pecans is needed because burning causes air pollution problems. Shredding of woody trimmings and incorporation into the orchard is an alternative method of disposal that appears to have no negative impact on soil properties.

c. Source of Federal Funds — Hatch

d. Scope of Impact — State Specific

Key Theme – Riparian Vegetation Management

a. Description of activity

This project examines how a range of grazing intensities and seasons of use affect vegetation, soil properties, and runoff in riparian areas of multiple-use in southwestern forests.

b. Impacts/accomplishments

Grazing trials conducted during Winter 2004 were successfully completed. However, woody riparian shrub measurements were compromised as cottonwood shrubs in Control (i.e., ungrazed) plots were heavily browsed (presumably by wild ungulates such as elk). Careful inspections of Control plots continue to determine regeneration of cottonwood shrubs.

c. Source of Federal Funds — Hatch

d. Scope of Impact — State specific

Key Theme – Water Quality

a. Description of activity

This research program focuses on the following areas of watershed management: 1) vegetation management effects on runoff and water quality; 2) irrigation ditch management effects on shallow groundwater quantity and quality; 3) development of watershed optimization models that examine the economic tradeoffs between alternative water uses, various institutional structures, and infrastructure changes; and 4) description and characterization of water supply reliability.

b. Impacts/accomplishments

- In streamside research, sites at NMSU facilities in northern New Mexico (at the Alcalde Sustainable Agriculture Science Center) and in southern New Mexico (as the Chihuahuan Desert Rangeland Research Center) were instrumented with wells to measure groundwater flow and water quality. Irrigation ditch flows and Rio Grande flows were also measured at both sites and hydrology and water quality interactions between surface water and groundwater were characterized over the 2004 irrigation season. At the northern site, 16% of ditch flow seeped to shallow groundwater. Field testing of crop seepage showed irrigation applications exceeding crop requirements resulted in seepage to shallow groundwater. The ditch seepage along with crop field seepage resulted in increased groundwater elevations and orientation of flow paths toward the river. Future work will measure additional components of the hydrologic budget in these streamside areas, particularly evapotranspiration from riparian vegetation and stream-riparian groundwater interactions.

- The upland component of this research will provide rangeland and water managers with strategies to clear vegetation and provide increased forage along with improved water quality and potentially increased water yields. Many of the tree clearing impacts will be realized by research continuing after direct tree removal in 2005 and beyond. The streamside component of this research has yielded immediate benefits to irrigation ditch associations, who have identified benefits of ditch seepage and postponed plans to line their ditches (thus stopping seepage) until further site assessments can be completed. Benefits of ditch seepage include providing return flow to the river that is available for downstream users later in the irrigation season, maintaining quantity and quality of shallow groundwater, and supporting riparian vegetation with its aesthetic, grazing, and wildlife values. The improvements in understanding of hydrologic budgets along streamside corridors will be useful water resources planning by irrigators, water managers, and entities charged with water quality protection.

c. Source of Federal Funds — Hatch

d. Scope of Impact — Multi-state Research
(with states AZ, CA, CO, GA, HI, IN, KS, NC, ND, NE, OR, TX, UT, WA)

Key Theme – Water Resources Management

a. Description of activity

This area of research focuses on the interaction of ecology, economics, and policy in managing water resources in New Mexico and the surrounding area.

b. Impacts/accomplishments

- Compared to existing institutions, economic analysis showed that future drought damages in the Rio Grande Basin states of Colorado, New Mexico, and Texas, could be reduced by 20% to 33% per year through intrastate and interstate water markets, respectively, that would allow water transfers across water management jurisdictions. The economic value of an additional acre foot of water made available to irrigated agriculture in central New Mexico ranges from $17 to $48 depending on whether water supply conditions range from 90 percent of normal supplies to 50 percent respectively. In southern New Mexico, equivalent values of water in agriculture range from $38 to $84.

- Measured in terms of changes in the amount of water diverted and impacts on the regional and state economy, there are significant effects by altering the current pattern of water use in New Mexico. The combined effect of reduced supply and increased instream flows can result in losses, primarily in agriculture, of nearly $14 million.

- NMSU irrigation-related research is contributing to a better understanding of the socio-economic aspects of irrigation on the urban fringe in the Elephant Butte Irrigation District and other irrigated areas. If changes in the irrigation system are going to occur or be induced (possibly for environmental objectives) knowledge of irrigators' motivations,

attitudes, and other socio-economic characteristics are essential. Reliable assessments of economic impacts, benefits, and costs will help the state's population and agricultural industries adapt to the radically changing future.

- Progress made on ecology included documentation of competition between native Rio Grande cutthroat trout and nonnative brown trout, description of the food habits of the endangered Rio Grande silvery minnow, and measurement of the effects of salinity on the egg and embryo of the species. This project is expected to have significant impacts on management of aquatic native species, especially those that are threatened or endangered. By defining ecological requirements, demographics, and genetics of native species, better management decisions for conservation of native species will be possible. Understanding how aquatic communities respond to human impacts will facilitate mitigation of impacts and will aid in developing strategies for sustainable use of water.

c. Source of Federal Funds – Hatch

d. Scope of Impact – Multi-state
With states CO, TX

Key Theme – Weather and Climate

a. Description of activity

This program focuses on providing climate information, including historical, real-time and prognostic, for the optimal management of agriculture and natural resources.

b. Impacts/accomplishments

Climate data continued to be collected and displayed for all the automated climate stations in the state. A soil temperature simulation model was developed and implemented based on air temperature and solar radiation. Four greenhouses on NMSU campus were instrumented and the data loaded onto the new climate center web page for use by students at NMSU. Users of climate data from the web site have been varied and numerous, ranging from information for legal purposes to data needed for research purposes.

c. Source of Federal Funds — Hatch

d. Scope of Impact — State Specific

Key Theme – Invasive Weeds

a. Description of activity

This research program focuses on understanding the mechanisms of herbicide action and tolerance or resistance in weeds and crops as well as characterizing plant/insect interactions as they relate to the success of biological control. Greenhouse and field

investigations are used to determine the effects of disturbance on vegetation and soil dynamics, including recovery from drought, fire, grazing, and invasive species.

b. Impacts/accomplishments

- The phylogenetic relationship among *Astragalus mollissimus* varieties coincided with their geographic distribution, but was unrelated to insect feeding preferences.

- African rue has become established in several western states, where it poses a threat of further spread because of its capability of reproduction by seed and vegetative lateral roots, as well as its apparent success under water-stressed conditions. In previous studies, applications of hexazinone, imazapyr, and metsulfuron have provided effective control of African rue. In this study, plant-herbicide-water stress interactions were investigated. This initial screening suggests that water status plays a role in altering African rue's sensitivity to herbicides.

- Scientists have characterized vegetative and reproductive development of African rue throughout the growing season, and have investigated the influence of soil moisture and temperature on African rue seed germination. Investigations of seedling response to water stress have shown that this species is capable of continued photosynthesis under moderate levels of water stress, and that individuals recover quickly from water stress. Herbicide efficacy is affected by water stress, with moderate water stress facilitating herbicide effectiveness. Investigation and verification of African rue physiology and response to herbicide using mature plants in extant, field conditions are ongoing.

- Abiotic (soil erosion, water infiltation rate, soil compaction, and soil chemistry) and biotic (species composition, total plant cover) response variables are being evaluated in response to 3 treatments: chemical control of mesquite, soil manipulations designed to reduce overland water flow and sediment yield, and reseeding at different times in the growing season. This experiment is long-term in nature, and will likely require 10 years or more to discern long-term effects of the treatments.

c. Source of Federal Funds — Hatch

d. Scope of Impact — Multi-state
(with states CA, FL, HI, IN, KS, NV, NY, OR, UT, WA)

Key Theme – Remote Sensing

a. Description of activity

The goal of this project is to develop procedures for using data from infrared photography and satellite images as modeling inputs and early warning tools for making timely and environmentally sound management decisions, such as planting date, irrigation scheduling, chemical application, and pest control.

b. Impacts/accomplishments

- Photosynthesis, leaf water potential and spectral reflectance have been measured on a pecan orchard under normal and limited irrigation.

- Daily satellite images of the Mesilla valley have been collected and are been processed to produce maps of land surface temperature, vegetation condition and albedo.

- Procedures have been developed that can obtain surface and air temperature from satellite data using satellite data and the meteorological forecast model MM5.

- These data are being used to interpret satellite and aircraft data and to develop models for monitoring plant development and conditions.

c. Source of Federal Funds — Hatch

d. Scope of Impact — State Specific

Key Theme – Plant Disease Protection

a. Description of activity

This program focuses on understanding plant pathogens and disease vectors to develop methods of protecting crop plants from diseases. This often entails weed management, as weeds often harbor disease vectors.

b. Impacts/accomplishments

- A greenhouse study was conducted in 2004 to examine the effect of nitrogen and potassium on the relationship between yellow and purple nutsedge and southern root-knot nematode. Initial results indicate that potassium sulfate, or perhaps the interaction between potassium sulfate and ammonium nitrate, may affect the interaction between root-knot nematodes and these nutsedge species. However, the results indicate that these fertilizers applied at these rates, alone or in combination, did not completely nullify the harmful effects from root-knot nematodes in either nutsedge species, particularly yellow nutsedge.

- Research on curly top virus has focused on the ecology, epidemiology, and predictive management of the disease caused in chile by the virus. Researchers identified and compared the virus strains found in chile and weeds, assessed their genetic variability, and analyzed their spatial and temporal distribution and showed that four different virus species simultaneously infect chile, and that virus infecting chile and weeds is often genetically identical. They identified a new species of curly top virus in chile, which they are continuing to characterize. Researchers have cooperatively determined the temperature and moisture requirements for germination of London rocket, a primary overwintering weed host for the virus and vector. Scientists identified a virus on onion, iris yellow spot tosposvirus that was new to the state. They determined that the virus was

transmitted by *Thrips tabaci* and showed onion varietal differences in susceptibility. In studies of how the environment influences the ungal-locoweed interaction, researchers have found that drought stress and acidic pH both greatly increase toxin production in fungal cultures and endophyte-infected plants.

- Curly top virus transmitted by the beet leafhopper causes significant losses to New Mexico chile. Scientists are developing a predictive model of curly top disease on chile based on environmental parameters. NMSU researchers have shown that the London rocket plant can serve as an overwintering host for the beet leafhopper. This research is providing chile growers with tools to manage curly top virus, thus improving their ability to grow a profitable crop.

- Progeny from the nematode *Meloidogyne incognita* from different hosts appear to differ in their ability to infect and reproduce on subsequent hosts. These findings suggest that plant responses to similar densities of root-knot nematodes in soil may vary depending upon the diversity of hosts responsible for the residual nematode inoculum.

- Results obtained from morphological and molecular studies on Phytophthora root rot showed a great genetic variability among isolates. Research was also conducted on the effect of soil salinity on infection of chile pepper by Phytophthora capsici. The study showed that plant infection by *Phytophthera capsici* is enhanced by salinity levels that may be encountered in chile pepper fields. Additionally, research indicates that salinity promotes disease development in chile plants susceptible to *P. capsici*, but not in those that are resistant to *P. capsici*. Information gained from this project has had an impact in programs aimed at breeding for resistance to *P. capsici*, and management of this pathogen in fields with high soil salinity.

- Researchers at the NMSU Agricultural Science Center at Farmington have been instrumental in the last fifteen years in controlling troublesome weeds both grasses and broadleaf common to the Four Corners Region in agronomic and horticulture type crops with lower than normal use rates. They also have assisted the chemical industry, EPA, and New Mexico Department of Agriculture in product registration. With lower use rates and still obtaining effective season long weed control, potential impacts from leaching and runoff (ground water) from target application has been virtually non-existent.

c. Source of Federal Funds – Hatch

d. Scope of Impact – Multi-state
(with states AZ, AR, CA, HI, MI, NE, OR, WA, WY)

Key Theme – Range Mangement

a. Description of activity

This program investigates the interaction of ecology and economics in managing rangeland natural resources.

b. Impacts/accomplishments

- Chemical control of sagebrush is expensive. An assessment of the potential economic benefits and longevity of control treatments requires an understanding of how forage production and grazing capacity benefits over the life of the treatment. NMSU Scientists estimate that more than 250,000 acres of sagebrush have been controlled in northwestern New Mexico and additional acres could be treated if the response is enough to justify the cost of control. This research suggests economic and ecological benefits beyond just forage for livestock production, such as improved rangeland health and condition, and watershed benefits. This research is unique in that data have been collected for 20 years, which allows quantification of sagebrush reinvasion rates and the determination of how the brush overstory suppresses production of desirable grasses. This unique dataset allows the economic study to estimate and define biological processes and estimate optimal timing of investments to retreat the brush infested area.

- Botanists in New Mexico now have a fairly up-to-date listing of the plants of the state, with correct nomenclature, synonyms, common names, and indication of origin. This is being widely used by numerous land managers, ecologists, ranchers and agriculturalists, professional botanists, consultants, etc. throughout the state, even though the listing has not yet been formerly published (but is available on-line). Work progresses toward a full-fledged manual for the plants of the state, with identification keys and geographic information. An accurate identification manual of the grasses of the state has been revised, adding numerous species and over 400 illustrations.

- Combined arthropod databases are now available via the Internet to researchers, government agencies, regulators, commercial companies, ranchers, farmers, and the general public. These data will be invaluable for analysis, conservation and management of pest, beneficial and alien species of arthropods. Special projects related to arthropod diversity on specific weeds have and will continue to produce valuable data for management of range weeds.

c. Source of Federal Funds – Hatch

d. Scope of Impact – State Specific

2. Cooperative Extension Service

Key Theme – Integrated Pest Management

a. Description of activity

In New Mexico, range lands, forests, and virtually every crop (for example, alfalfa, chile, pecan nuts, various fruit and greenhouse/nursery crops, cotton, corn, and small grains) can be considered as candidates for IPM. In the course of this state program, the investigators use various educational methods, materials, and all appropriate media to aid growers, crop consultants, and industry groups in identification of and management techniques for the various plants and animals in and around their fields and pastures. In recent years, urban IPM has come into its own; some of the investigators on this program have extended their educational efforts to urban/suburban clientele.

b. Impacts/accomplishments

- In New Mexico NMSU's boll weevil research and suppression efforts were responsible for saving millions of dollars in the Pecos Valley alone between 1998-2001 in reduced insecticide applications and yield losses. From 1996-2001 we developed a pest management program for suppressing boll weevil populations in New Mexico both prior to and during eradication programs. This program capitalized on our natural advantage, having an arid climate and used cultural controls, and precise timing of insecticide applications to minimize control costs and environmental impacts. Although much of this work is particularly applicable to New Mexico, it has implications for developing control measures that can reduce insect damage in other less arid areas where conditions are more variable and it is more difficult to determine effects of low relative humidity and high temperatures in the field. In the last few years of this project we have expanded from cotton to other important New Mexico crops including alfalfa. Saving one insecticide application on 300,000 acres of alfalfa would save NM farmers $6 million per year. If just 10% of the acreage were spared an insecticide application the savings still would be $600,000 per year. There would be additional impact from the added value of higher yields.

c. Source of Federal Funds -Smith Lever 3(b)(c)

d. Scope of Impact -State Specific

Key Theme - Water Conservation

a. Description of activity

This program 1) educates county agents, master gardeners, golf course and other ground maintenance personnel about effective, economical, and environmentally-sound turfgrass establishment and maintenance; and 2) selects turfgrass species and cultivars that are best

suited for the different climatic regions of New Mexico, and disseminates the results to stakeholders.

b. Impacts/accomplishments

- The Turfgrass Specialist installed and established sub-irrigated, low maintenance turfgrass plots at the Agricultural Science Centers at Tucumcari and Alcalde.

- A 40,000 ft^2 demonstration and research area at the NMSU golf course was built and turfgrass research and demonstration area at the Fabian Garcia Research Center was installed to investigate irrigation efficiency of alternative irrigation systems. The Turfgrass Specialist will examine different irrigation methods and root zone materials that affect water use efficiency, turf performance and water movement, and will test suitability of high saline ground water for turfgrass irrigation. These areas will provide NMSU with an example of cutting-edge turf irrigation technology and will serve as a real world demonstration to be used during field days and for extension training.

- A student who graduated from NMSU with a degree in horticulture and who was directly involved in conducting the research described, started his own landscape contractors company after graduation. His company specializes in the installation of subsurface irrigation systems in home lawns. Several subsurface drip systems have been installed in Las Cruces since the company was founded. Based on the results of this research project, Santa Fe High School administrators decided to install a subsurface drip irrigation system into a new baseball field at their high school.

c. Source of Federal Funding -Smith Lever 3(b)(c)

d. Scope of Impact -State Specific

Key Theme - Wildlife Management

a. Description of activity

Many New Mexicans exhibit an interest in wildlife for varied reasons and illustrate a need for life history information as well as management information. Up-to-date information is needed to guide these individuals in their management endeavors to ensure the long-term sustainability of our natural resources. Technical information outlining the methods of control for wildlife damages is greatly needed. Natural resource management agencies also need accurate, unbiased information and research oriented data to help resolve conflicts that arise over the management of the natural resources occurring in the state. The youth of New Mexico also are keenly interested in the wildlife that occurs across the state and require accurate information to further their knowledge about the wildlife resource.

b. Impacts/accomplishments

Information has been distributed through extension publications, published scientific studies, workshops, presentations and verbal communications with anyone interested in obtaining knowledge about wildlife, its habitat needs, and habitat improvement techniques. Research and demonstration studies have been conducted to investigate the interactions between wildlife and livestock on public and private land. Faculty have participated in meetings, serve on committees, and coordinate workshops and symposiums to arbitrate conflicts between natural resource managers, consumers, and producers. Teaching materials have been developed to be used in natural resource educational curriculums and conduct educational programs for youth in 4-H, FFA, and the public school system. An inventory was designed to quantify the habitat associated with Middle Rio Grande Conservancy District (MRGCD) drains and canals and provide a baseline for evaluating structural operational changes in the water conveyance system. The inventory was designed to provide vegetation data to compliment a larger research study entitled "Agricultural Irrigation Systems and Conservation of Native Fishes" by Dr. David Cowley. The current project was conducted in cooperation with the ESA Workgroup Collaborative Program for Rio Grande silvery minnow and southwestern willow flycatcher.

c. Source of Federal Funding -Smith Lever 3(b)(c)

d. Scope of Impact – Integrated Research and Extension

Key Theme - Riparian Management

a. Description of activity

The Riparian Management Program at New Mexico State University is designed to work with producers, natural resource managers, state and federal agencies, and other interest groups to promote and teach sustainable riparian area management while simultaneously maintaining their value to producers. The Extension Riparian Management Specialist is responsible for teaching and promoting state-of-the-art techniques for riparian area management. Where the current scientific literature fails to provide adequate guidance for riparian area management, research is conducted to develop the knowledge-base necessary to make informed management decisions.

b. Impacts/accomplishments

In cooperation with County Extension faculty in many counties throughout New Mexico, demonstration projects have been and continue to be established to assist in educational programming. Included in the list of demonstration projects are research sites which serve the dual purpose of study areas as well as outdoor laboratories where participants can see the results of research and management activities.

c. Source of Federal Funding – Smith Lever 3(b)(c)

d. Scope of Impact – State Specific

Key Theme – Water Quality/Quantity

a. Description of activity

Population growth along New Mexico's river valleys is among the fastest in the nation, resulting in a greater demand for domestic use of surface and groundwater supplies. The hydrologic impacts from drought, federal claims to water, growing population demands, invasive species, and institutional barriers to conservation have begun to seriously threaten the economic, social, and cultural future of the state. In an effort to provide practical solutions to problems relating to agricultural and urban water conservation, programs address irrigation efficiency, drought mitigation, water policy, state and regional water planning, and hydrologic watershed modeling.

b. Impacts/accomplishments

- A USDA grant of nearly one million dollars for research, Extension and education of irrigation efficiency for water conservation has been maintained. Twenty research/Extension and nine county Extension projects are on-going. The NMSU College of Agriculture and Home Economics Water Task Force facilitated policy education activities including lecture series, state water planning programs, adjudication education, review of water quality proposed revisions and hydrolgic modeling of the Rio Grande Basin.

- An inter-departmental and inter-collegiate team is seeking funding to develop a Regional Evapo-transpiration Estimate Model (REEM) by using ground measurement towers and algorithm equations to validate ET as determined from satellite imagery. The process has showed impressive accuracy at determining daily ET rates from a variety of major crops. Knowing the consumptive uses of plants on a real time basis can significantly improve irrigation efficiency, invasive species management, adjudication processes, and more.

c. Source of Federal Funding -Smith Lever 3(b)(c)

d. Scope of Impact – Multi-state (TX)

Key Theme – Range Management

a. Description of activity

The Range Management programs at New Mexico State University are designed to work with and provide unbiased, science-based knowledge to producers, range managers, state and federal agencies, and other groups to promote sustainable use of rangelands.

b. Impacts/accomplishments

- On average, about 150,000 acres are treated annually in New Mexico for brush control. Agricultural economists estimate that the economic benefit of a brush or weed control program averages approximately $3.10 per acre per year. Therefore, the estimated economic benefit would be about $465,000 per year, or about $2,325,000 over a five-year period for the state.

- Four formal consultations with agency and grazing permittee were held this past year with agreements being reached in three of these cases. Five rancher initiated monitoring programs were conducted in New Mexico. Follow-up to these workshops indicate that approximately 35% of the ranchers attending actually initiated a range monitoring program. Trainings were held for USDA-Forest Service range specialists in the Gila, Lincoln, Santa Fe, Carson and Cibola National Forests on the RAM inventory procedure. This procedure was formally adopted by Region 3 of the Forest Service as a testimony to its need and effectiveness in addressing those needs.

- The environmental consequences of this program are the reduction of non-productive and noxious weeds and brush, enhanced productivity of the rangeland, and improved water use efficiency including replenishing the ground water supply. The ultimate environmental impact is the regeneration of beneficial plants that stabilize the environment, diminish water runoff, reduce soil erosion, and contribute to the food chain.

c. Source of Federal Funding – Smith Lever 3(b)(c)

d. Scope of Impact – State Specific

Key Theme – Nutrient Management in Soils

a. Description of activity

This program reassessed the distribution of manure and the potential impact on crop land from a nitrogen loading standpoint. Additionally, salinity impacts have been evaluated from continuous application sites. The effects of irrigation systems and cropping patterns also have been assessed with regards to nitrogen leaching.

b. Impacts/accomplishments

Data collected from this project helps direct best management practices for minimizing environmental impacts while optimizing crop yield. More than 60 people have been trained in comprehensive nutrient management training programs as a result of much of this work. These individuals then work with individual dairies and farmers to make recommendations for optimum production and meet environment department requirements. Many costs have been avoided by dairies that may have otherwise been fined due to mismanagement of nutrients from manure and effluent water.

c. Source of Federal Funding – Smith Lever 3(b)(c)

d. Scope of Impact – State Specific

Goal 5: Enhanced economic opportunity and quality of life for Americans.

Overview

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 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 efforts.

The New Mexico Agricultural Experiment Station and Cooperative Extension Service believe that they are meeting the short-term goals outlined under Goal 5 in the 5-year Plan of Work submitted in July 1999.

Total expenditures for Goal 5 were $80,805 from Hatch Act funds. The number of full-time equivalents engaged in research for this goal was 5.38 FTE.

Total expenditures for Goal 5 were $513,068 from Smith-Lever 3(b)(c) Act funds. The number of full-time equivalents engaged in extension activities for this goal was 8.0 FTE.

1. Agricultural Experiment Station

Key Theme – Organic Farming Development

a. Description of activity

Organic farming in Northern New Mexico at the Alcalde Ag Science Center and in Southern New Mexico at the Fabian Garcia Ag Science Center is producing economic gains for small farmers.

Faculty in agricultural economics and agronomy and horticulture departments are testing a model for organic small scale farming as a model for teaching sustainable production in an arid climate. This project 1) provides an opportunity for student experiential and

service learning by establishing and operating a student-managed fresh vegetable and herb garden, and 2) development of faculty organic research projects.

A website was completed for the Nutrient Bioavailability: Phytonutrients and Beyond project. The website enables the user to view information about the mission of the project. Annual reports and a list of publications for each year are also posted on the site. Links to all of the Agricultural and Cooperative Extension Services at the various Land Grant universities and the 1890 institutions have also been included. Links to all scientists participating in the project are also included. Such links enable the user to find scientists that are working in an area in which he or she may have a question. A page with tips related to doing bioavailability research is planned for the future. The URL is *http://agesvr1/agepages/marbock/W1002/index.html*

b. Impacts/accomplishments

- The first Organically Certified research acres at New Mexico State University were established at the Center to assist fruit, medicinal herb, and specialty crop growers interested in producing and marketing organically. Based on this research, several local growers have begun to grow and sell organic strawberries grossing the equivalent of up to $40,000 per acre. Research plots using under-tree sprinkler systems in tree fruit and drip systems in berries and medicinal herbs, has resulted in several growers adopting these methods and thus irrigating more efficiently on their farms. Several growers are also using the under-tree sprinklers for protection against late spring frosts--a serious challenge for local fruit growers. Research on medicinal herbs as alternative high value crops is based on traditions, culture, and expansion of markets. Results indicate that, depending on current prices, returns per acre can be quite substantial. Interest in fruit and medicinal herb production has grown substantially; in 2004 we had significantly higher than expected turnouts at special-topic field days highlighting our fruit research (260 plus attended) and medicinal herb research (about 150 attended).

- Planning has begun with the Community Action Agency to prepare a joint proposal to grow local organic vegetables for distribution to regional food pantries and other agencies that serve low-income residents and small underserved Hispanic farmers. We are quantifying the economics of small scale intensive organic production using drip irrigation. A local farmer was identified who has adopted the organic farming model and began his own farm and organic farming organization this fall. He recruited 110 members, and about 75 memberships for a cooperative enterprise. We helped the farmer order seeds, prepare transplants, layout his field, organize his membership recruitment, distribution and core group.

c. Source of Federal Funds – Hatch

d. Scope of Impact – State specific

Key Theme – Children, Youth and Families at Risk

a. Description of activity

Problems such as substance abuse, teen pregnancy, and juvenile delinquency, have their antecedents in early childhood. When parents of preschool children use inconsistent and ineffective methods of discipline, children become noncompliant and abrasive. To prevent substance abuse and other risky behaviors, parenting education is needed to promote family bonding and teach discipline skills to at-risk families.

Every $1 spent on prevention of problems saves the state $7 on intervention services. The families who graduate from the parenting classes are less likely to commit child abuse, and their children are much less likely to engage in risky behaviors during adolescence. Decreasing the number of youth in foster care due to abuse or neglect, and decreasing the number who get pregnant, abuse drugs, or commit violence saves the state money.

b. Impacts/accomplishments

Fifty parenting class series were offered for teen parents, foster parents, incarcerated parents, unmarried parents, grandparents raising grandchildren, families involved with the juvenile justice system, and families dealing with substance abuse in 16 counties in New Mexico. Six hundred sixty parents and 816 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, inappropriate expectations of children, and oppression of children's independence.

c. Source of Federal Funds – Hatch

d. Scope of Impact – Multi-state (with AZ, TX)

Key Theme – Family Resource Management

a. Description of activity

Communities and businesses are struggling to adapt to change in the workforce. This project proposes to investigate how individuals regard themselves in their multiple roles, determining to what extent issues of identity and sense of self are key components of the well-being of individuals and families as they respond to social and economic changes.

b. Impacts/accomplishments

Coding schemes and statistical analysis procedures were developed in consultation with the statistician on the project. The Canadian data were collected and are being coded. The PA data were not collected as the colleague in PA left the project. Data collection sites at

the Zuni Pueblo in New Mexico and in Mississippi were established. The MS data were collected and coded. The Masters thesis based upon a subset of data from this data set was accepted by the graduate committee and completed in April, 2003. Selected quantitative data have been analyzed. More will be analyzed in 2004-05. Qualitative data have not yet been analyzed. Data that have been analyzed to date have been disseminated through the NM Cooperative Extension Service in the form of mass media (radio and print media).

c. Source of Federal Funds – Hatch

d. Scope of Impact – Multi-state (with states CA, ID, MT, OR, UT, WY)

Key Theme – Impact of Change on Rural Communities

a. Description of activity

The purpose of this research is to improve the understanding of the significance agriculture plays in our quality of life and the quality of our environment; locally and globally. Program objectives include being able to 1) Identify and describe the organizational structure of agricultural programs, statewide, 2) Identify and describe those components and practices, which correlate with agricultural program success, and 3) Determine the relationship of agriculture programs on learner outcomes.

b. Impacts/accomplishments

A more agriculturally literate society means a better-educated populace, which can make better decisions as citizenry and as consumers. In addition, more people will be exposed to agricultural opportunities, as agricultural literacy improves, and will be more likely to enter agricultural science careers. This project is improving the understanding of the critical significance agriculture plays in our quality of life and the quality of our environment, locally and globally.

c. Source of Federal Funds – Hatch

d. Scope of Impact – Multi-state (with states AZ, IA, MT, OR, UT, WA)

Key Theme – Leadership Training and Development

a. Description of activity

Family and Consumer Sciences is a career field that is experiencing a severe educator shortage across the United States. Also, minorities are an underrepresented group in the ranks of FCS educators. A current assessment is needed of the projected demand for Family and Consumer Sciences educators in New Mexico and the El Paso, Texas, area schools as well as in the Cooperative Extension Service and other community agencies. Current accurate data are needed.

b. Impacts/accomplishments

The impacts of this first year of the project were that four of the mentees became Family and Consumer Sciences Education majors in the program at NMSU based on the mentoring experiences that took place in Spring 2004. Long term impacts will include the recruitment of many individuals to the program with the projection of better filling the need for Family and Consumer Sciences educators for Extension and the public schools in the future. Funding has been acquired from outside sources to continue the project. Project materials are used by Family and Consumer Sciences Education majors to enhance their teaching in the schools. Family and Consumer Sciences majors participate as monitors and presenters at the workshops. All materials are also available to all county Extension home economists.

c. Source of Federal Funds – Hatch

d. Scope of Impact – Multi-state (with TX)

Key theme – Agricultural Education and Research

I. Secondary Agricultural Education

a. Description of activity

Using a survey and working with a committee, the goal of this project was to improve secondary agricultural education in New Mexico by assessing the status and safety of agricultural mechanics facilities and creating a statewide agricultural education office.

b. Impacts/accomplishments

The results of this study will give direction for agricultural education program development efforts, and pre-service and in-service agricultural education teacher professional development efforts related to developing excellence in New Mexico agricultural education. The results will help validate the "Local Program Success" program as a model for achieving academic and other indicators of excellence in New Mexico secondary school agricultural education programs. The research will help state agricultural education leaders to diffuse the "Local Program Success" program to secondary school agricultural education teachers and programs.

II. Improving the Quality of Research

a. Description of activities

Even poorly designed studies and experiments can be expensive to implement. This project connects statisticians to researchers to enhance the research from conception to conclusion. Statisticians work directly with researchers to provide

guidance and expert advice on the appropriateness and correctness of the research design, appropriate analyses, and correct and appropriate interpretation of results.

b. Impacts/accomplishments

More than 65 projects in AES and CES received the services of a statistician, thereby increasing the likelihood of more efficient use of research dollars.

c. Source of Federal Funds — Hatch

d. Scope of Impact — State Specific

2. Cooperative Extension Service

Key Theme – Children, Youth, and Families at Risk

a. Description of activity

Many parents in New Mexico experience unstable relationships, early parenthood, limited educational and economic opportunities, and incarceration. These patterns are often transmitted from one generation to the next. New Mexico has been rated as one of the worst places in the nation to raise children (Children's Defense Fund, 1999). According to the 1998 Advisory Committee Input, 87.5% of New Mexico's counties identified parenting education as their top program priority. However, the availability of effective parenting education program in New Mexico is extremely limited.

The goal of the CYFAR project is to increase Extension's outreach to children, youth, and families who have few resources to meet their emotional and educational needs. In addition, activities to strengthen the New Mexico Cooperative Extension system's capacity to work with at risk families are being developed so that these programs can be sustained once grant funding ends. Objectives to be measured include knowledge gain for individuals in county educational programs, degree of community collaboration in a county program, and qualitative data on program operations and progress.

b. Impacts/accomplishments

- Parenting programs are providing parents and children with skills that will: (1) Increase levels of empathy for the needs of others (2) Increase family communication and expressiveness (3) Build family support and cohesion (4) Increase awareness of the developmental needs of other family members (5) Learn alternatives to hitting and yelling (6) Substitute nurturing parenting practices for abusive parenting practices (7) Learn money management and employment skills (8) Gain knowledge in healthy nutrition practices (9) Participate in activities focusing on youth development. (10) Families will experience a more stable and nurturing environment due to increased knowledge, healthy attitudes, and application of effective parenting skills, life-skills and nutrition.

- Personnel with the Parents as Teachers Program in Dona Ana County organized an infant support group for mothers with newborns. They are teaching infant care, educational strategies to use with infants, and information on stress reduction for parents. Pre/ post test data will be available in 2005.

- The Safe Interview Room is a two-room facility equipped with videotape equipment, play materials and a one way mirror viewing room in which children of suspected abuse are interviewed and videotaped. Using this procedure, children must only tell their story once for court purposes. Since its opening in February 2002, more than 50 children were interviewed. Previously these children would have had to travel 100 miles to the nearest similar facility. In conjunction with the facility and the county Extension office, 43 individuals attended a workshop, What Do We Do Next: Sex Crimes Investigation Team Building and Protocol Management sponsored by the New Mexico Coalition of Sexual Assault Programs, District Attorney's Office, Taos/Colfax Community Services, Children, Youth and Families Department.

- Youth at risk programs take many forms. Over 12,000 youth in eleven counties have involved youth in life skill development through four grants provided by Office of Juvenile Justice and Delinquency Prevention. Objectives include 1) Involve caring adults in providing opportunities for adolescents to participate in 4-H delivery modes, 2) Offer challenging opportunities to develop life skills. They include decision-making, wise use of resources, communication, accepting differences, leadership, useful/marketable skills, healthy lifestyle choices and self-responsibility, 3) Strengthen community partnerships and collaborations to ensure a stronger 4-H program foundation and shared youth commitment.

- CYFAR funding was used to provide a portion of the statewide in-service training to 35 county agents, 50 paraprofessionals, 8 academic and Extension faculty, 7 administrators, and 8 Navajo project workers in March, 2004. Evaluations showed that participants increased their understanding of violence prevention as a result of receiving written resources and hearing the speaker on Pathways to Peace-40 Steps to a Less Violent America.

c. Source of Federal Funds — Smith-Lever 3(b)(c)

d. Scope of Impact — State Specific

Key Theme – Child Care/Dependent Care

a. Description of activities

Children, Youth & Families at Risk Project (CYFAR) Factors such as poverty, isolation, low literacy, lack of education, and limited social support put families at risk. One or several of these risk factors keep many New Mexico families from reaching their full potential. While the New Mexico Cooperative Extension Service works hard to meet the needs of this audience, the system's capacity needs to be strengthened in order to more

fully meet the needs of this at risk audience. For this reason USDA/CSREES provides funds, renewable for up to five years (2000-2005), for Extension programs to address the needs of families at risk and for the Extension system to strengthen its capacity to work with families at risk.

The Colfax County Child Care Task Force, made up of 7 community agencies, is the organizing and steering unit for the community CYFAR project. Involving a number of agencies in the project increases the probability that the program will be sustained in the future. As an example, the Caring for Children Workshops are now cosponsored by the Child Care Research and Training Project of Luna Community College.

b. Impacts/accomplishments

Follow up interviews of task force members showed that the long term accomplishments of the CYFAR project include the increased collaboration between agencies to integrate services and increased visibility to the community of available resources. One task force member said that they think in terms of community programs now instead of just their own individual program. Their vision has increased as a result of the grant program and the task force committee, and members are now more aware of all the needs of the community. Members believe that the grant has been a bridge between the agencies and the community, providing information and community resources, which individuals and families of the community may have missed. According to task force members, over the last four years, the impact this program has had on childcare providers, families, and on the community as a whole, has been very positive. In addition to the creation of the task force itself, the greatest impacts have come from high quality training opportunities for providers, help for families in search of dependable daycare and helping families improve childcare practices, the development and maintenance of the safe interview room, as well as the free screenings and health information available at the health fair. Individual interviews with community members show that the Safe Interview Room Facility is considered one of the most rewarding outcomes of this project. Community collaborators include the New Mexico State Police, Raton Police, Colfax County Sheriff's Department, Child Protective Services, Taos Safe Room Facility, and New Mexico Children, Youth and Families Department.

c. Source of Federal Funds – Smith-Lever 3(b)(c)

d. Scope of Impact – State Specific

Key Theme – Consumer Management

a. Description of activities

Basic budgeting programs were incorporated in to the Nurturing Parenting Programs, presented to Habitat for Humanity families, and to participants in six county programs.

b. Impacts/accomplishments

- Written evaluations from the Los Alamos program indicated that participants learned skills in money management, and follow up with participants showed continued interest in starting a retirement /investment plan. In a money management class for teen age boys in Otero County, the boys reported that the class helped them realize the importance of math skills in their school studies and that many of their financial goals were attainable if they make a plan and make choices.

- In San Miguel County, 30 clientele received budgeting information and half indicated they had learned new ways to manage their budgets. Seventeen Child Care providers in Dona Ana County learned the unit pricing method for determining the best value when purchasing food products for their home or center day care business. Data from 275 participants in the Strengthening Families/Fatherhood imitative indicated increased knowledge in the area on money management.

- The increase from pre to post-test scores was significant at the .0001 significance level. Life skills including home management and job readiness were part of the Strengthening Families/Fatherhood Initiative. In addition, life skills programs were presented in Grant, Otero, and Bernalillo counties.

- Developmentally delayed adults in Otero learned problem solving and teamwork skills. They learned communication and to appreciate feedback from one another, even those that rarely talk. In Grant County, six unemployed residents were assisted in writing resumes and letters of intent. Of these three have secured employment. America Saves was introduced to the county Home Economics agents at the 2002 In-Service.

- The program was presented to the over 270 participants of the Strengthening Families/Fatherhood Initiative. Besides setting savings goals, those who enroll receive a quarterly newsletter, which has ideas for increasing savings, to encourage them to continue saving.

- Lincoln County and Los Alamos County presented the Legal Check-Up in their Counties. A modification of the program was presented in Quay County. Participants were provided with the information needed to develop the Legal Documents that need to be in place such as a will, a living will and durable power of attorney.

c. Source of Federal Funds – Smith-Lever 3(b)(c)

d. Scope of Impact – multi-state, with states ME, TX, VA, and international: Investing for your Future, an on-line investing course, has had enrollees from most states and several countries abroad including Germany, England and Korea.

Key Theme – Family Resource Management

a. Description of activities

The Home Ownership Program is designed to develop a model Homebuyer Education Curriculum available in English and Spanish as well as an Educator Guide to increase home ownership in New Mexico.

b. Impacts/accomplishments

Focus groups have been conducted with potential first time homebuyers, recent homebuyers, non-profit housing organizations, bankers and mortgage officers, realtors, builders and retirees to obtain their input into curriculum content. A conceptual framework was developed for the curriculum. Work was done with Agriculture Communications to design a logo and a Web site home page. A Home of My Own/ Mi Propia Casa. This specialist developed the curriculum content for the consumer side of the web site in the area of Money Management. Topics include Making you money work, using credit, building savings, selecting a financial institution, creating a record keeping system, and determining readiness to buy a home. Developed criteria for evaluating print and media resources and Web sites for the project. Maintenance documents were collected and are being edited. The Home Buyer section is written and undergoing review. Educator guides for the Money Management section are developed and are being pilot tested. The material on the consumer side of the Web site will be available in pdf files for printing.

c. Source of Federal Funds – Smith-Lever 3(b)(c)

d. Scope of Impact – State Specific

Key Theme – Family Resource Management (b)

a. Description of activities

In Los Alamos County, the Extension Home Economist conducted the Men Making Meals program. 15 older male caregivers learned how to make nutritious and cost effective meals while alleviating the isolation that accompanies caregiving for a family member. In Santa Fe County, the Extension Home Economist partnered with the Food for Santa Fe Supplemental Food Program to distribute healthy snacks to an estimated 6,000 children, whose families are homeless or low income. Food is distributed via a drive through process.

b. Impacts/accomplishments

- A pre-survey showed that 80% of the men had done little to no cooking previously; 75% knew little to nothing about cooking nutritious meals and had little confidence in their ability to cook. A post-survey showed that although none of the participants actually increased the amount of cooking at home, 71% increased their level of confidence and

35% increased their knowledge of cooking nutritious meals. The program was highlighted twice in the newspaper, Los Alamos Monitor.

- The agent designed an evaluation tool for Food for Santa Fe to determine food needs and reasons families needed supplemental food banks. 132 families completed the survey: 73% were Hispanic, 14% Anglo, 13 % other ethnicity; 76% were male and 24% were female. 77% had an income of less than $14,000 per year; 11% of the total sample says that they receive food stamps. Primary reasons written for needing the supplemental foods were that they have a low income, they were hungry, or it is needed. The food items found most useful were eggs and potatoes and the foods they would like to see added to the food bag were fresh fruits and canned meats. Extension's role in the program was highlighted in Food Bytes, Summer 2004, which is a publication of the Food for Santa Fe Organization.

c. Source of Federal Funds – Smith-Lever 3(b)(c)

d. Scope of Impact – State Specific

Key Theme – Parenting

a. Description of activities

The Baby's First Wish Parenting Newsletter Program can improve the level of parenting skills in New Mexico by providing timely information to the parent at the teachable moment. Baby's First Wish, an age based parenting newsletter for babies aged one month to 36 months, was mailed to a range of 6,846 to 7,899 families in all 33 New Mexico counties every month to equal a range of 82,152 to 94,788 newsletters mailed annually. Recipients mirrors New Mexico's population.

b. Impacts/accomplishments

Evaluations have shown that while one family member is listed on the mailing address label, as many as 4 other family members may read the age based newsletter. This means that the range of individuals reading the newsletter could range from 6,846 per month to 31,596 (7,899 x 4). Teen parents, first time parents, as well as experienced parents, are being served. Based on previous evaluations done nationally and statewide, it is expected that parents will increase their knowledge regarding child development and guidance each time they read each newsletter, treat their baby more positively, and reduce the likelihood of child abuse and neglect.

c. Source of Federal Funds — Smith-Lever 3(b)(c)

d. Scope of Impact — State Specific

Key Theme – Leadership Training and Development

a. Description of activities

Last year New Mexico had 5,042 adult volunteer leaders in the 4-H Youth Development Program. These individuals serve as organizational leaders for clubs/groups, project leaders, activity leaders, and resource leaders. These 4-H Leaders provide a significant amount of direct contact with 4-H youth and are essential partners in the New Mexico 4-H Youth Development Program. Adult 4-H leaders provided leadership, encouragement and guidance to 75,395 youth this past 4-H program year in 1,289 clubs, special interest groups/day camps, school enrichment classes and after school programs.

b. Impacts/accomplishments

Leaders served in advisory, chaperone, building management, and additional positions during 4-H educational events at county, district and state levels. Parent/Leader Advisory Association meetings were held. There was a statewide increase in adult leader enrollment of 440. This increase coupled with the increase of 562 leaders in the previous year, brings the total increase in two years to 1,002 new 4-H leaders.

c. Source of Federal Funds – Smith-Lever 3(b)(c)

d. Scope of Impact – State Specific

Key Theme – Literacy

a. Description of activities

In Rio Arriba County, the County Program Director/ Home Economist conducted a program on Steps to Student Success with 71 parents. The program is designed to help parents help their children with study skills, homework, and test taking.

b. Impacts/accomplishments

- Survey results after the program showed that 90% of parents increased their knowledge on the topic and 98% planned to follow up by changing their behavior in checking children's homework and helping children prepare for tests. A follow up survey 5 months later had a 25% response rate. Among the results were: 94% regularly praised their children's efforts in school; 94% helped children with homework; 83% helped children prepare for a test.

c. Source of Federal Funds – Smith-Lever 3(b)(c)

d. Scope of Impact – State Specific

Key Theme – Promoting Business Programs

a. Description of activities

Economic survival in the future will depend to a large degree upon the use of information technology. Many rural decision makers and businesses are not convinced of the magnitude of this development. It is possible for businesses in rural New Mexico to compete nationally and even worldwide, but the necessary adoption of new innovations and technology is limited. Perhaps even more important than the lack of telecommunications infrastructure in rural areas is a general lack of understanding of the importance of joining the Information Economy. For business, "the key question is not whether to deploy Internet technology - companies have no choice if they wish to stay competitive - but how to deploy it."

As a tool, the Internet can help rural communities and businesses overcome many of the traditional barriers to viable economic development, such as isolation, low population density, and mobility disadvantages. The Internet has provided a means of defeating distance disadvantages, but implementing the new technology has not become a high priority for rural communities and businesses.

It makes sense for those in rural areas to turn onto the Internet - today's electronic highway - to take them where they need to go. It's faster. It's more efficient. It's more convenient. It's the main road to the mainstream for rural and minority citizens, giving them access to new knowledge, enhanced lifestyles, more efficient community services, better business practices, and greater prosperity.

b. Impacts/accomplishments

- The concepts explored and the skills taught at the T-ABCs workshops include: how to build a simple 6-8 page template-based Web site; the basics of Web marketing via search engines and links; how to upload product video demos; ways to get potential customers closer to a purchase; how to set up effective online advertising; ideas for newsletter sponsorship; the importance of quick and accurate navigation tools; metatags; and how to optimize the use of each Web page.

- Small-business owners said after the Farmington workshop, “Thank you so much for a wonderfully informative workshop. I have never learned so much useful information in one day!” Lamb, recalled that she “has implemented many of the techniques [she] learned [such as] naming pages, alt tags on photos, keywords, [and] signing up with browsers. Linda went on to say that “because of my excitement with what I learned in Farmington, my sister has taken similar Web classes and is working hard to include c-commerce in her business.”

- Many enthusiastic written evaluations were also received. “Great session taught by real people who have been there!” “Very valuable information and examples of successful and not-so-successful Web sites.” “I enjoyed the willingness of other small-business

owners to share their experiences in developing and using their websites." And, "I will never look at a Web page in the same way again—including my own!"

c. Source of Federal Funds – Smith-Lever 3(b)(c)

d. Scope of Impact – State-wide, multi-state, and international

Key Theme – Tourism

a. Description of activities

REDTT was created in 1992 as a three-year pilot project to provide education, training and technical assistance to five economically depressed counties in southern and southeastern New Mexico. It works through county tourism councils set up in each of the counties it serves. Each council meets monthly, with a member of the paid REDTT staff attending as technical assistant, to determine tourism goals for the coming year, increase council participation and improve tourism countywide and regionally. REDTT also conducts a yearly rural tourism conference, open statewide, to help tourism volunteers and professionals learn more about successful tourism techniques and programs.

b. Impacts/accomplishments

Rural Economic Development Through Tourism (REDTT) secured coverage for 123 festivals and special events across New Mexico. A short radio program is produced about each event and distributed to more than 40 radio stations. To date, REDTT has produced about 375 releases about events, generating about $60,000 in media coverage. More than 271 tourism volunteers and professionals from all 16 REDTT counties and across New Mexico attended REDTT's annual statewide Rural Tourism Conference. The attendance represented a 65 percent increase over the previous year. The goals of REDTT's program include: 1. Understanding visitor needs and expectations; 2. Tips and techniques for successful hosting; and 3. Tourism facts and figures. Tourism is the state's second largest industry and generates nearly $3.65 million in revenue each year and provides more than 75,000 jobs. REDTT continued development and expansion of the REDTT web site: www.nmquest.org

c. Source of Federal Funds – Smith-Lever 3(b)(c)

d. Scope of Impact – State Specific

Key Theme – Workforce Preparation

a. Description of activities

New Mexico works is a program designed to help New Mexico families acquire employment skills needed for financial advancement. NM Works helps TANF (Temporary Assistance for Needy Families) participants enhance their skills and employability through education and training and transitions families from welfare to

work. The program offers courses in parenting, money management, securing permanent housing, developing life skills, improving language skills and earning GED certification.

b. Impacts/accomplishments

Statewide, the number of households receiving cash assistance has dropped from more than 34,000 in 1995 to about 17,500 today. To date, NMSU's program in Region 3 has consistently exceeded all other state regions in employment placement. NM Works reached 2,603 employments for 2003-2004.

c. Source of Federal Funds – Smith-Lever 3(b)(c)

d. Scope of Impact – State Specific

Key Theme – Youth Development/4-H

a. Description of activities

4-H is a proven informal, hands-on Youth Development program that can help youth gain knowledge in job skills, consumer skills, money management, nutrition and health, life skills, personal and family development, and communication skills.

b. Impacts/accomplishments

Life skills are taught through a variety of methods. 4-H Competitive events are designed to give youth hands on training and a practical knowledge of various subject matters. In addition 4-Hers learn subject matter concepts through hands-on experiences, develop skills through project work, competitive events, real-life situations, and career exploration opportunities, practice informed decision-making when selecting consumer goods and agricultural products keep accurate project records which are submitted for project evaluation and completion, speak at club, county, and community events strengthening communication and organization abilities as well as self-concept, and participate in club, county, district, state and national 4-H events that develop leadership, teamwork, and citizenship potential.

c. Source of Federal Funds – Smith-Lever 3(b)(c)

d. Scope of Impact – State Specific

Key Theme – Youth Farm Safety

a. Description of activities

Kids, Kows and More is designed to bring the farm to the city by teaching young people to appreciate agriculture and understand where their food comes from. The program, which began in El Paso, Texas, in 1990, has expand across 16 counties in New Mexico

with support from Texas A & M and Southwest Dairy Farmers, who helped get the original program started in El Paso.

b. Impacts/accomplishments

Seventy formal evaluations were received from participating teachers across the 16 counties. Twenty-three rated the program as good and thirty-three rated it as excellent. Fourteen stated that the program complimented their class room subject matter. Written resource materials were distributed to the teachers to reinforce subjects covered. Attending students are now more aware of the local agriculture industry and the source of their food.

c. Source of Federal Funds – Smith-Lever 3(b)(c)

d. Scope of Impact – State Specific

B. Stakeholder Input

The New Mexico Agricultural Experiment Station received input regarding research priorities from the following stakeholder groups: agricultural science center advisory boards during their regularly scheduled quarterly meetings, interim state legislative committees, general public during field days at the off-campus agricultural science centers, and various commodity commissions listed in the New Mexico State University 5-Year Plan of Work (1999). The Agricultural Experiment Station also received guidance from the New Mexico Extension Support Council, which represents the county constituency from across the state, during their annual meeting as well as during the College of Agriculture and Home Economics All-College Conference.

In addition to the New Mexico Extension Support Council, a large and diverse group of stakeholders are regularly involved in helping the Cooperative Extension Service plan for the future. Across the state, more than 1,500 people serve on local county advisory committees, over fifty people serve on the statewide Extension Support Council and over five hundred producers, commodity group members, and community organizations contribute directly to the Cooperative Extension Service's planned program directions.

Last year, the Extension Support Council formally included representation from the Agricultural Science Centers so that stakeholder needs and issues could be more easily communicated to and discussed with the research community.

C. Program Review Process

There have been no significant changes in the program review process for either the New Mexico Agricultural Experiment Station or the New Mexico Cooperative Extension Service.

D. Evaluation of the Success of Multi and Joint Activities

The multi-state, multi-institutional, and multidisciplinary activities, joint research and extension activities carried out by the New Mexico Agricultural Experiment Station and the New Mexico Cooperative Extension Service addressed the critical issues of strategic importance as listed in the 5-Year Plan of Work submitted July 1999, including issues identified by our stakeholders. The planned programs addressed the needs of under-served and under-represented populations in New Mexico. Although we believe that the programs will result in improved program effectiveness or efficiency, we do not yet have sufficient program data to determine the degree of effectiveness/efficiency being achieved in all programs.

E. Multi-state Extension Activities

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(Attach Brief Summaries)

Institution **New Mexico State University**
State **New Mexico**

Check one: X Multi-state Extension Activities
____ Integrated Activities (Hatch Act Funds)
____ Integrated Activities (Smith-Lever Act Funds)

	Actual Expenditures				
Title of Planned Program/Activity	**FY 2000**	**FY 2001**	**FY 2002**	**FY 2003**	**FY 2004**
Profitable Livestock Production		18,000	26,317	25,252	7,856
Invasive Noxious Weeds		19,260	11,783	7,239	14,072
Development of Culturally Sensitive Materials		20,000	8,659	9,205	14,005
Life Skills Through Knowledge		13,210	11,421	12,669	13,081
Range Management Education		6,500	26,064	13,990	10,496
Pecan Nut Management		6,500	12,541	0	0
Dairy		12,150	12,177	11,620	7,559
Volunteer Development		7,610	7,614	11,478	8,878
Water Education		18,625	0	0	6,589
Wildlife Management		7,500	12,948	13,005	704
Plant Pathology		0	11,832	11,890	643
Total		129,355			

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Institution **New Mexico State University**
State **New Mexico**

Check one: X Multi-state Extension Activities
____ Integrated Activities (Hatch Act Funds)
____ Integrated Activities (Smith-Lever Act Funds)

	Actual Expenditures				
Title of Planned Program/Activity	**FY 2000**	**FY 2001**	**FY 2002**	**FY 2003**	**FY 2004**
Urban Horticulture		0	11,110	0	0
Food Safety		0	10,287	0	139
Integrated Pest Management		0	2,110	0	812
Infant Nutrition and Welfare		0	11,490	0	622
Environmental Manure Management		0	0	9,923	8,744
Profitable E-Commerce		0	0	17,390	11,290
Financial Management Education		0	0	14,833	5,081
Rural Leadership		0	0	10,415	0
Total		129,355	176,353	193,167	110,571

_____ _____
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Descriptions of Multi-state Research and Extension Activities

Invasive Weed and Brush Control Management Programs

The New Mexico State University Invasive Weed and Brush Control Management programs are coordinated with management efforts in Arizona, Colorado, Idaho, Montana and Texas. The passage of the Noxious Weed Law in the 1998 legislative session signaled an increased awareness to this issue. Recently, data has shown that lands in the west are being taken over by these species at the rate of 200 acres/hour. Awareness, education, and management are the key components in addressing this problem. State-of-the-art management information and recommendations are provided to weed management groups, state and federal land management agencies and private producers in public meetings, training sessions and field trips.

Invasive brush and weeds are found in every county of the state and they are a serious problem on New Mexico rangeland. The purpose of this program is to demonstrate the most efficacious methods of controlling end managing noxious brush and weeds on rangeland. Historically, 135 demonstration-research trials have been in place throughout New Mexico. These trials are installed at the request of county Extension faculty, producers, governmental agencies or agri-business. Each trial demonstrates control of a specific species of brush or weed. Control measures are usually mechanical, chemical, biological or a combination of methods. Annually, all trials in place less than four years are evaluated to determine target species control and subsequent forage response. Data are then used as the basis for recommendations in educational programs.

These non-native plant species are impacting the southwest through increased production costs, reduced land values, elimination of biodiversity, reduced recreational opportunities, and a general reduction in state revenue. This issue impacts all citizens in the southwest, not just the agricultural producer.

Improving Dairy Practices

The New Mexico State University Dairy Program has collaborated with several College of Agriculture and Home Economic departments and science centers including the Department of Animal and Range Sciences, Extension Home Economics Department, Artesia Agricultural Science Center, and Tucumcari Agricultural Science Center. The dairy program covers a wide range of aspects related to dairy farming and production. Information dissemination takes place through extension demonstration projects, experimental research projects and college courses pertaining to dairy science. Multi-state collaboration was established between the NMSU Dairy Program and Arizona, Oklahoma, Texas, and California. These Multi-state ventures included production management workshops, extension fact sheets and monthly newsletters.

Western Region Volunteer Development

Adult volunteers provide a significant amount of direct contact with 4-H youth and are essential partners in the 4-H Youth Development Program for maintaining and expanding the

New Mexico 4-H program. Four-H volunteer leaders must be recruited, selected, oriented, trained, supervised, evaluated and recognized for a sustaining volunteer program to exist. An increasing number of adult 4-H volunteers are being empowered to assume roles that, in the past, have been filled by Extension 4-H faculty and staff: This allows for more outreach to under-served youth audiences, the addition of new 4-H projects or activities and the on-going development of unpaid and paid 4-H staff.

Increased retention of volunteers is a challenge. Adult leaders need options of how and when to be involved, as their priorities regarding volunteer, personal and work commitments change over time. Volunteer leaders need orientation and education about the organizational structure of 4-H, 4-H delivery modes, affirmative action requirements, risk management efforts, enrollment procedures, youth protection standards, youth friendly attitudes, leadership styles, leadership roles, 4-H projects, and local, state, national and international 4-H opportunities. Adult 4-H leader enrollment in New Mexico declined by over 500 in the 1998-1999 program year. The 4-H Volunteer Specialist is focusing on bringing volunteer development resources to counties. A 4-H volunteer recruitment video has been provided to each county office along with printed volunteer resources. New Mexico is a member of the western region marketing committee which studies the issue of volunteer recruitment and is currently collaborating with western states serving on that committee.

Profitable Livestock Production

Livestock operations and the sale of cattle and calves is the single highest revenue generating agricultural enterprise in New Mexico, with nearly 1 billion dollars in cash receipts annually. However, many independent operations are challenged with maintaining profitability due to acute or chronic production problems that result in inefficient output. The basis of this major program is to address the variety of needs of livestock producers to increase the likelihood of profitability and to therefore maintain stability in this important contributor to the state economy. In cooperation with Texas A&M University, and USDA-NRCS offices in Texas, Oklahoma, Colorado, and Kansas, educational camps and Ranch-to-Rail programs are conducted.

Development of Culturally Sensitive Materials

The NMSU Agricultural Communications Department does a number of media projects annually that integrate AES and CES functions. Recent projects include: a series of 22 web based games for outreach into remote and minority communities where youth might not experience a traditional 4-H club; Cybercamp educational songs and games; on-line resources for the Southwest Rangeland Invasive Plants initiative; national distribution of ‘Fight Bac!’ on CD-Rom. .A number of additions were made to our multilingual video and computer-based educational programs, including Sheep and Beef Meat Handling (Navajo) and Spanish Home Child Care.

Life Skills through Knowledge

In order to prepare New Mexico youth to become knowledgeable, productive citizens, they must possess basic life skills. Four-H is a proven informal, hands-on youth development

program that can help youth gain knowledge in job skills, consumer skills, money management, nutrition and health, life skills, personal and family development, and communication skills. Youth development takes place in many different formats, such as livestock and horse schools, novice camps and workshops. The Life Skills through Knowledge program works to provide opportunities statewide for 4-H members to develop skills that can be used for a lifetime. Society as a whole, the state of New Mexico, multi-state program opportunities (especially with neighboring Arizona and Colorado) and individual communities benefit greatly when young people learn life skills that enrich their lives, now and in the future. Major program focuses include communication skills, resistance to peer pressure, community service, time management; drug prevention programs, problem solving, conflict resolution, and decision making. Many of New Mexico's current business and community leaders have recently emerged from the 4-H youth development program.

Range Management Education

Monitoring elk utilization on upland and riparian areas began in 1996 and continues in cooperation with the Gila Permittee Association. This project was initiated through a "Farmer- Rancher Grant" program in the U.S. Department of Agriculture (USDA). It is being continued with Cooperative Extension Service support. The data collected are being provided to the U.S. Forest Service, the New Mexico Department of Game and Fish and the Gila Permittee Association (including residents of Arizona). These data provide information on which sound management decisions can be carried out.

Financial Management Education

Wise financial management practices enhance the economic stability of families. How families use their money—whether they spend it or save it—affects the total economic picture of the nation. Educational programs that provide basic family resource management and financial planning are important to the well-being of New Mexicans. The Cooperative Extension Service seeks to provide research-based programs that will assist New Mexicans, both youth and adults, in developing effective money management skills and sound consumer habits. Programs offered include America Saves, 4-H Mini-Society, High School Financial Planning Program, and Investing for your Future.

Plant Pathology

The plant pathology program provides training for county agricultural agents, growers, and the general public on (a) the basic concepts of plant pathology, (b) the information required from the grower for accurate diagnosis, (c) pathogen and abiotic affects on plants and the subsequent response of the plant to attack by disease agents (recognition of plant disease symptoms and signs), and (d) specific plant diseases (recognition and management). In 2002, the Karnal bunt laboratory screened five samples from regulated counties and three samples for the National Survey. Timely reports of the Karnal bunt lab activity were sent to USDA and NMDA. Reports also were sent to county agents and wheat growers/elevator operators. New Mexico Karnal bunt testing results were provided for the National Agriculture Pest Information Survey (NAPIS).

Urban Horticulture

In New Mexico, concerns over water conservation linked to a desire to maintain attractive landscapes, has increased the need and desire for reliable, research based, water conserving gardening information. Commercial and institutional landscapes and professional landscape managers are aspects of New Mexico's agriculture. Extension specialists hosted State and Regional Southwest Yard and Garden Television shows to teach gardeners proper and effective gardening methods for the unique environment of the American Southwest and conducted monthly radio garden question call-in programs (coverage from S. Colorado to Alamogordo, Tucumcari to Grants). These shows reached thousands of people, informing them of appropriate plants and gardening techniques for this region.

Integrated Pest Management

Extension is helping in this area by reducing insect damage and insect control costs, particularly for cotton, chiles, alfalfa, and pecans. This program is addressing control in a number of ways including developing techniques that will dramatically reduce the cost of eradication. Extension specialists are also developing low-no cost techniques to reduce pests through modification of habitats and growing conditions to increase desiccation in this desert environment. In conjunction with the Chile Task Force and concurrence by cotton producers in south central New Mexico, a “Cotton and Chile Scouting School” was held for producers, processors and others interested in these two commodities. It was assigned Continuing Education Credits from pesticide license holders in New Mexico and Texas along with CEUs for Certified Crop Advisors in New Mexico and Texas.

E-Commerce Project

Business people and aspiring business people are acquainted with business on the internet. Focus for outreach are the small communities, rural communities and underserved populations. Workshops are held to present the basic information and individual contacts established for follow up and continued training. Training trainers is another piece of this effort, with established business leaders, CES agents, and faculty learning how to train others in the art of e-commerce. The increase in the number of businesses as well as the increased revenue for existing businesses contributes to the economical well being and improved quality of life for New Mexicans.

Wildlife Management

An under-tapped possibility for economic development in New Mexico rests with the landowners who could pursue a variety of wildlife enterprises. Through publications, workshops, presentations and individual contact, ranchers, farmers and the ecotourism industry have been provided with the information needed to utilize wildlife and fisheries as a means for primary or supplemental income. Improvement in the land is a possible additional advantage to wildlife enterprise.

Food Safety and Nutrition

The nutritional needs of the residents of New Mexico are being met through a number of programs. To address food safety and nutrition programs are presented to homemakers, day care providers and school children, the Food Safety mobile visits the state fairs, brochures and publications are disseminated throughout the state. The high number of New Mexicans with diabetes, and at risk for diabetes, are offered classes on diet, cooking, and nutrition, as well as an opportunity to identify medical tests through "On the Road to Living Well with Diabetes." At risk families are introduced to nutrition, and healthy eating through classes coordinated with other federal programs, along with healthy snacks provided directly to participants.

F. Integrated Research and Extension Activities

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Institution **New Mexico State University**
State **New Mexico**

Check one: ____ Multi-state Extension Activities
_xx_ Integrated Activities (Hatch Act Funds)
____ Integrated Activities (Smith-Lever Act Funds)

	Actual Expenditures				
Title of Planned Program/Activity	**FY 2000**	**FY 2001**	**FY 2002**	**FY 2003**	**FY 2004**
Agricultural Economics	7,392	7,909	2,544	0	2,918
Nutrient Management	3,454	3,696	0	1,262	2,150
Pest Management of Cotton	3,454	3,696	0	8,791	2,191
Pecan Nut Development	1,796	1,922	3,135	0	0
Forage Fiber Tradeoff -- Piñon-Juniper Woodlands	6,908	7,392	18,624	9,809	3,607
Integrated Weed Management for NM Rangeland	6,217	6,652	8,095	4,925	3,039
Costs & Returns for Crops & Livestock	4,836	5,175	22,215	939	1,587
Risk Management in Ag. & Natural Resources	6,217	6,652	2,709	4,775	2,297
Vegetable Production	1,589	1,700	2,694	0	3,742
Turfgrass, Soil, Water	1,658	1,774	1,856	1,866	1,919
Dairy Production	1,243	1,330	1,705	1,544	2,449
Total	44,764	47,898			

_____ _____
Director Date

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State **New Mexico**

Check one: ____ Multi-state Extension Activities
_xx_ Integrated Activities (Hatch Act Funds)
____ Integrated Activities (Smith-Lever Act Funds)

	Actual Expenditures				
Title of Planned Program/Activity	**FY 2000**	**FY 2001**	**FY 2002**	**FY 2003**	**FY 2004**
Riparian Management	2,556	2,735	3,235	3,250	3,356
Systematic & Floristic Studies of SW Plants	6,217	6,652	7,473	0	2,892
Cattle IPM	7,599	8,131	0	0	5,004
Biological Control of Rangeland Weeds	6,908	7,392	6,752	0	8,014
Food Safety	1,036	1,109	1,372	2,069	1,417
Integrated Media Projects	0	0	7,608	3,038	2,793
Water Quality	0	0	3,845	1,595	0
Brush & Weed Management	0	0	1,571	2,368	1,367
Peanut Research	0	0	7,359	0	3,175
Fruit & Nut Orchard Managment	0	0	0	2,932	3,612
Total	69,080	73,917	102,792	57,470	

_____ _____
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Institution **New Mexico State University**
State **New Mexico**

Check one: ____ Multi-state Extension Activities
_xx_ Integrated Activities (Hatch Act Funds)
____ Integrated Activities (Smith-Lever Act Funds)

	Actual Expenditures				
Title of Planned Program/Activity	**FY 2000**	**FY 2001**	**FY 2002**	**FY 2003**	**FY 2004**
Human Nutrition	0	0	0	0	2,494
Jobs and Family	0	0	0	0	1,448
Water Policy	0	0	0	0	7,086
Germplasm Conservation & Use	0	0	0	0	7,187
Agrochemical Impacts	0	0	0	0	3,716
Microirrigation	0	0	0	0	7,161
Root-Knot Nematode Genetics	0	0	0	0	4,381
Genetic Resources for Cotton	0	0	0	0	3,617
Range Improvement Task Force	0	0	0	0	13,042
Soil Water Pesticide Issues	0	0	0	0	4,299
Total	69,080	73,917	102,792	57,470	

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Institution **New Mexico State University**
State **New Mexico**

Check one: ____ Multi-state Extension Activities
_xx_ Integrated Activities (Hatch Act Funds)
____ Integrated Activities (Smith-Lever Act Funds)

	Actual Expenditures				
Title of Planned Program/Activity	**FY 2000**	**FY 2001**	**FY 2002**	**FY 2003**	**FY 2004**
Economic Risk Management	0	0	0	0	2,297
Integrated Pest Managment	0	0	0	0	2,191
Soil, Water & Agr. Productivity	0	0	0	0	5,794
	0	0	0	0	0
	0	0	0	0	0
	0	0	0	0	0
	0	0	0	0	0
	0	0	0	0	0
	0	0	0	0	0
	0	0	0	0	0
Total	69,080	73,917	102,792	57,470	122,243

_____ _____
Director Date

Form CSREES-REPT (2/00)

U.S. Department of Agriculture
Cooperative State Research, Education, and Extension Service
Supplement to the Annual Report of Accomplishments and Results
Multi-state Extension Activities and Integrated Activities
(Attach Brief Summaries)

Institution New Mexico State University
State New Mexico

Check one: ____ Multi-state Extension Activities
____ Integrated Activities (Hatch Act Funds)
_xx_ Integrated Activities (Smith-Lever Act Funds)

	Actual Expenditures				
Title of Planned Program/Activity	**FY 2000**	**FY 2001**	**FY 2002**	**FY 2003**	**FY 2004**
Range Improvement Task Force	20,450	24,724	6,854	13,219	14,458
Systematic & Floristic Studies of SW Plants	2,727	3,000	1,319	0	1,356
Peanut Research	10,452	18,000	12,766	0	0
Riparian Management	9,089	20,000	9,705	9,751	5,034
Vegetable Production	11,361	15,000	13,469	17,562	23,324
Soil, Water Pesticide Issues	5,908	10,000	3,113	5,126	4,475
Integrated Media Projects	58,623	50,000	15,447	6,167	24,324
Economics Risk Management	5,226	7,500	1,982	0	600
Brush and Weed Management	12,951	15,000	6,284	9,472	8,200
Integrated Pest Management	9,089	15,000	7,028	15,865	4,211
Food Safety	9,089	0	5,486	21,998	11,337
Total	154,965	178,224			

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	Actual Expenditures				
Title of Planned Program/Activity	**FY 2000**	**FY 2001**	**FY 2002**	**FY 2003**	**FY 2004**
Water Quality	6,817	8,000	10,005	11,963	4,941
Pecans Nut Development (discontinued)	12,724	14,000	15,677	0	0
Turfgrass, Soil, Water	11,361	15,000	13,921	5,597	8,637
Costs & Returns for Crops & Livestock	8,180	10,000	3,940	15,574	4,065
Excess Property	6,817	7,500	18,414	7,394	0
Dairy	11,361	13,000	6,413	5,919	8,890
Soil, Water, and Ag. Productivity	3,636	25,000	24,137	6,624	0
Agricultural Economics (discontinued)	8,407	0	0	0	0
Food Safety and Nutrition (discontinued)	2,954	0	0	0	0
Fruit & Nut Orchard Management	0	0	0	8,437	5,640
Plant Pathology					8,170
Total	227,222	270,724	175,960	180,819	

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Check one: ____ Multi-state Extension Activities
____ Integrated Activities (Hatch Act Funds)
_xx_ Integrated Activities (Smith-Lever Act Funds)

	Actual Expenditures				
Title of Planned Program/Activity	**FY 2000**	**FY 2001**	**FY 2002**	**FY 2003**	**FY 2004**
Nutrient Management	0	0	0	0	4,475
Pest Management of Cotton	0	0	0	0	2,105
Forage Fiber Trade Off	0	0	0	0	1,328
Integrated Weed Management for NM Range	0	0	0	0	3,039
Risk Management in Ag & Natural Resources	0	0	0	0	1,200
Cattle Integrated Pest Management	0	0	0	0	4,079
Soil, Water, and Ag. Productivity	0	0	0	0	0
Agricultural Economics (discontinued)	0	0	0	0	0
Food Safety and Nutrition (discontinued)	0	0	0	0	0
Fruit & Nut Orchard Management	0	0	0	8,437	0
Plant Pathology					0
Total	227,222	270,724	175,960	180,819	153,888

_____ _____
Director Date

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Descriptions of Integrated Research and Extension Activities

Costs and Returns of Crop and Selected Livestock Enterprises in New Mexico

There is a definite need to examine the effect of costs and returns of crop and livestock enterprises on the structure of New Mexico farms and ranches and the resulting response to conservation policies, commodity programs, chemical restrictions (such as EPA Section 18 applications), water quality, and quantity problems, and other national and state policy concerns. This project draws on the combined expertise of all County Extension Agents, many state Cooperative Extension Service specialists, and many Agricultural Experiment Station researchers. We have successfully drawn on this combined expertise of the College each year over the last 15 years to publish a projected set of cost and return estimates as a Cooperative Extension Service release and an actual (after actual yields and prices have been established) set as an Agricultural Experiment Station research report.

Research–Extension Continuum for Soil, Water and Agricultural Productivity

The Agricultural Science Center at Farmington is located in the driest portion of New Mexico. Demand on water resources is great and increasing. Diverse groups, including rural, urban, municipal, industrial, Native American, and agricultural, have vested interests in water use. Approximately 60% of the surface water exiting New Mexico is within this system and downstream groups are also demanding their allotment of the river. For agriculture to continue in the Four Corners region and the rest of the State, management strategies and crop species must be found that more efficiently use this valuable resource. To address the conservation of soil and water in this semi-arid environment, a research project has been established to investigate subsurface drip irrigation (SDI) for several economically viable crops. The increased efficiency of SDI has translated into increased crop productivity. The Navajo Agricultural Products Industry has requested the Center to use the research results of this project to develop plans for the transition of abandoned rectangular side roll fields into productive SDI fields for high value crops. A Diné College (1994 Land-Grant Institution) demonstration farm is being developed in Shiprock, NM. The Center has been requested to provide input into the design of the proposed irrigation system, a sizable component of which is drip. Orchard managers and urban horticultural enthusiasts have requested the Center for advice on low water application technologies. These technologies will be included in an irrigation workshop for farmers, ranchers, and other interested parties from the Four Corners region. The workshop is the second in a series of collaborative irrigation workshops being organized by Colorado State University, Utah State University, the University of Arizona, and New Mexico State University. Such activities are the deliberate streaming of information along the research – extension continuum. This Soil, Water and Agricultural Productivity project is designed to facilitate this sort of information exchange.

Food Safety

Our Food Safety program offers information, resources, and training in a number of important areas. Food processors are provided programs on producing safe food products. Food handling and safety workshops are offered with particular emphasis on restaurants and tourism facilities. In all arenas, state and federal regulations are emphasized and assistance in

developing and maintaining compliance with these regulations. The testing facility, established earlier, serves as an important resource in this effort.

Biological Control of Rangeland Weeds

This is an AES/CES project to demonstrate that inundative biological control with *Aphthona* flea beetles can be used as a tool for eliminating small isolated populations of a noxious weed: leafy spurge (*Euphorbia esula* L.). By using early intervention techniques we hope to prevent the spread of leafy spurge, which could potentially become a serious problem impacting at least 50,000 ha in New Mexico alone. Knowledge gained from this project will be shared with the scientific community, the extension community, and private landowners. The primary beneficiaries of our efforts are landowners. Tours were conducted at each location throughout the lifetime of the project. Landowner involvement ensures there is producer-to-producer information exchange. Information on the projects outcome was disseminated through radio interviews, the popular farm press, scientific journal articles, and other means. The Extension State Weed Scientist organizes an annual noxious weed short course and provides talks to interested producers and land managers from New Mexico and surrounding states (Colorado, Arizona, and Utah). The PIs gave presentations at many different venues, including the New Mexico Vegetation Management Association annual meetings, Native Plants Society meetings, garden clubs, county agent training sessions, and New Mexico Soil and Water Conservation Districts annual meetings.

Brush and Weed Management

Noxious brush and weeds are found in every county of the state and are a serious problem on New Mexico rangeland. Data have shown that lands in the West are being taken over by these species at the rate of 200 acres/hour. The purpose of this program is to demonstrate the most efficacious methods of controlling end managing noxious brush and weeds on rangeland. Historically, 135 demonstration/research trials have been in place throughout New Mexico. These trials are installed at the request of county Extension faculty, producers, governmental agencies, or agribusiness. Each trial demonstrates control of a specific species of brush. Control measures are usually mechanical, chemical, biological, or a combination of methods. Annually, all trials in place less than four years are evaluated to determine target species control and subsequent forage response. Data are then used as the basis for recommendations in educational programs. Awareness, education, and management are the key components in addressing this problem. These non-native plant species are impacting our state through increased production costs, reduced land values, elimination of biodiversity, reduced recreational opportunities, and a general reduction in state revenue. This issue impacts all citizens of the state, not just the agricultural producer.

Improving Dairy Practices

The Improving Dairy Practices program focuses on increasing efficiency of both human and animal production. Information is offered to producers through constant update of the website, newsletter, publications, and one-on-one communication. Workshops pertaining to employee management, reproduction efficiency, heat stress, milk quality issues, fitting/showing for 4-H heifer projects, and other pertinent topics are conducted in four general locations throughout the state: south of Albuquerque, Las Cruces area, and two sites

in eastern New Mexico. Opportunities for interested students to acquire further knowledge of the dairy industry through distance education and internship programs exist through the extension dairy program.

Vegetable Production

The vegetable production program at NMSU integrates AES and CES functions. The target clientele is commercial vegetable producers. The focus is on drip irrigation, fertilizer use, pest management, and varieties. Some of the recent AES activities have been a field experiment on the effect of planting date and fungicide treatment on stand establishment of chile pepper at Leyendecker Agricultural Science Center and Pumpkin cultivar trials at Leyendecker and Artesia Agricultural Science Centers. Examples of recent extension activities include an on-farm demonstration of drip irrigation at the Rincon Farm of Marty Franzoy and a short course on drip irrigation on November 9, 2000, that attracted 130 participants.

Pest Management of Cotton

The needs of extension clientele drive this research program. Over the past five years we have had research/extension programs that have addressed one of our most immediate problems-boll weevil establishment in New Mexico. We have operated monitoring programs in conjunction with, and funded by grower organizations, to detect early infestations as well as migration lines to determine the source of infestation. At the same time we conducted research trials that would develop pest management tools to suppress and help eradicate boll weevil. Boll weevil establishment and control in New Mexico is different than in other areas of the cotton belt that are more humid. We found, for example, from both our extension monitoring program and our research program that overwintering habitat particularly in urban areas had a major influence on the success of boll weevil establishment and subsequent yield losses. Implementing the resulting recommendations for weed control and delayed planting saved farmers in south Eddy County over $50/acre in 1998 alone.
A number of cultural techniques were tested that proved to be effective in boll weevil control that have also been recommended. We are also supporting eradication efforts by developing techniques that will save programs Beltwide money, for example in developing better boll weevil traps and in testing experimental microencapulated formulations that may reduce application intervals in half potentially saving cotton farmers in eradication zones over $30 million per year.

Systematic and Floristic Studies of Southwestern Plants

This project continued plant identification services, as well as providing information about range plants and plant toxicity upon request. The PI edited the “The New Mexico Botanist” newsletter; four issues appearing, compiled and maintained “A Working Index of New Mexico Vascular Plant Names” on the web, maintained links to information sites about poisonous plants, copies of “The New Mexico Botanist” newsletter, and a list of identification sources for New Mexico plants, and presented plant identification workshops.

Integrated Media Projects

The NMSU Agricultural Communications Department does a number of media projects annually that integrate AES and CES functions. Recent projects include: a series of 22 web based games for outreach into remote and minority communities where youth might not experience a traditional 4-H club; Cybercamp educational songs and games; on-line resources for the Southwest Rangeland Invasive Plants initiative; national distribution of 'Fight Bac!' on CD-Rom. .A number of additions have been made to our multilingual video and computer-based educational programs, including Sheep and Beef Meat Handling (Navajo) and Spanish Home Child Care.

Turfgrass, Water Quality, and Soil and Water Conservation

There are numerous places throughout the state that are covered by Turfgrass and require management strategies to achieve and maintain optimum quality. There are approximately 90 golf courses in New Mexico, numerous athletic fields (baseball, soccer, football fields), and parks and home lawns. Water is the biggest concern in turf management as quantity and quality can rarely be maximized for optimum growth and maintenance. Especially for athletic fields, such as high school football fields, the resources are not readily available to provide adequate turfgrass maintenance. Therefore, the conditions on these fields range from very poor to average. Homeowners spend a great deal of time and resources to achieve the perfect looking lawn and are often prevented from reaching their goals because of water quality, quantity, and species selection. Golf courses range in quality from the top fifteen nationwide for public golf courses to poor quality due to water restrictions.

Nutrient Management

Plant nutrients are found in both synthetic and organic materials such as farmyard manure and composts. Animal feeding operations in New Mexico have increased since 1982 resulting in a 56,000 head increase in dairy cows alone. Commensurate with this increase is increased manure production that can be utilized for crop production. However, repeated and excessive applications of manure to cropland can cause nutrients to buildup and cause negative environmental and livestock health implications. Unique soil properties found in New Mexico offer some degree of protection against many of problems found in the eastern U.S. However, permits issued to animal feeding operations require some form of tracking and accounting for the nutrients applied to cropland. Nutrient management is a best management practice suitable to all persons utilizing the land for economic plant production. Managing nutrients for sufficient plant growth, animal nutrition, and environmental compatibility will assure a safe and reliable source of food and fiber in New Mexico. Additionally, proper nutrient management practices will maintain economic viability of New Mexico's cropland and livestock producers.

Riparian Management

During FY 1999–2000, the New Mexico State University Riparian Management Program participated in state- and regional-level activities incorporating both AES and CES missions. At the state level, the NMSU Riparian Management Program conducted AES-sponsored

research and transferred information via CES programs regarding sustainable management of livestock in southwestern riparian ecosystems. Audiences included state and federal management agencies, State and County Faculty in the Cooperative Extension Service, and private producers through public meetings, training workshops, and field trips. At a regional level, the NMSU Riparian Management Program collaborated with faculty, specialists, and administration representatives to explore cooperative research and outreach funding in Arizona, Montana, and Utah, among others. Research and outreach topics focused on landscape-level watershed, riparian, and wetland management.

Integrated Pest Management

Ranked by annual cash receipts, alfalfa, chile, pecan nuts, various fruit (apple, cherry, grape) greenhouse/nursery crops, cotton, corn and small grains are the leading plant crops for New Mexico producers. The boll weevil, pink bollworm, cotton bollworm and cotton aphids resistant to various insecticides have become key pests for the state's cotton crop; while genetically engineered cotton cultivars are now available to the state's producers, the added *Bacillus thuringiensis* genes protect the developing bolls only to a point from caterpillar problems. Alfalfa weevil, three species of aphids, and occasional caterpillars continue to plague the alfalfa crop; cyclic populations of grasshoppers and blister beetles cause occasional crop losses and, in the case of blister beetles, subject growers to legal liabilities and additional economic losses. Several species of aphids plus additional arthropods, diseases and weed pests are annual problems for corn, small grain, nut and fruit crop producers. In the last five years, European corn borer has been detected infesting corn in two additional counties (total now of seven infested New Mexico counties), karnal bunt-infested wheat seed has brought new regulations to the south-central part of the state, sorghum ergot has invaded the milo fields of eastern New Mexico, and pecan nut casebearer has become well established in pecan groves and yard trees throughout Dona Ana County. Pepper weevils, various caterpillars and whiteflies are major threats to both the fresh and processed chile markets in the state. Chile and other vegetables generated over $163 million in New Mexico farm income during 1997; over 1 million acres of these crops are irrigated.

Approximately 70 million acres in the state are devoted to livestock grazing; nearly 10 million acres of non-federal land are forested. Range caterpillars, grasshoppers, and various forest pests (bark beetles, tussock moths, mistletoes, etc.) are periodic pests in these rangeland or forested areas; in addition, invasive, exotic weeds (musk thistle, various knapweeds, yellow star thistle, etc.) are continuing to spread in various parts of the state, out-competing native plants and replacing them with less desirable, less palatable and even toxic species for livestock and wildlife.

Of the approximately 1.5 million people in the state, nearly 75% live in urban centers with 2500 or more people. Consequently, pests of urban ornamentals affect the greater percentage of clientele. Surveys continue to indicate severe over-reliance on commercial pesticides by homeowners and pest control operators to control major and nuisance pests in the state. Urban ornamentals and turf have been attacked by ash whitefly, ash bark beetle, tomato spotted wilt virus and other pests; on-going drought has further weakened landscape plants, making them more susceptible to an assortment of arthropods borers and defoliators. The

nursery and greenhouse industries have been shaken by invasive red imported fire ants and Japanese beetles in Dona Ana and Bernalillo Counties, respectively.

An advisory group exists for the urban landscapes IPM program; various crop commodity groups for cotton, alfalfa and chile make suggestions for IPM programs in those commodities. New Mexico also participates in the USDA-APHIS-PPQ Cooperative Agricultural Pest Survey Program. Data from agricultural, rangeland and forest pest surveys are gathered and entered into the National Agricultural Pest Information System data base. The program documents the occurrence and movement of various pests within and between states and tracks exotic pests introduced from other countries.

Risk Management in Agriculture and Natural Resources

The risk that prices can move enough to cause major economic damage to agricultural producers has long been a significant problem. Likewise in the new era of deregulation, other industries such as finance, utilities and energy face the same risks that agriculture faces. Tools exist, such as futures, options, and swaps, that can help manage the risks of price changes and thus be helpful to industries. This project looks at each industry and the tools that can help provide economic benefits to those that choose to use them.

Range Improvement Task Force

The Range Improvement Task Force (RITF) seeks to extend the Agricultural Experiment Station and Cooperative Extension Service's efforts by investigating impacts to federal lands, focusing at the ranch-unit level. It provides objective information to ranchers and governmental policy makers, and offers solutions to rangeland issues/disputes based on science. The RITF's only concern is the long-term health of rangeland.

Integrated Weed Management for New Mexico Rangelands

This project studies weed establishment, persistence, and interference within rangeland ecosystems by evaluating fire and herbicides in different seasons and application procedures to produce desired vegetation mosaic. The scientists are developing low-input, sustainable approaches utilizing integrated control methods to achieve desired vegetation response. The results are disseminated via Extension workshops.

Peanut Research Program

Peanuts are a mainstay cash income commodity for Eastern New Mexico. With approximately 18,000 acres and income of approximately $15 million, peanuts average more than $800 per acre. This is the single largest income-producing crop for producers. As peanuts are sold primarily in shell, quality is a major factor related to price received. Maintaining this quality through control of diseases such as Web Blotch, Southern Blight, *Rizoctonia*, Pod Rot, Blackhull, and *Fussarium* becomes extremely important. The breeding program is also designed to maintain quality through development of disease resistant varieties. Other production variables include fertility management programs and irrigation. Drip irrigation studies relate to water consumption and lowering input costs. Four other projects for the year included herbicide studies for weed control. Other minor projects are

conducted to evaluate control of early season insects such as thrips and worms. Late season insects include beet armyworm and grasshoppers. All of these programs focus on research-based information transferable to producers through publications, news media, field days, and quarterly meetings with the Peanut Research Board and annual meetings with the New Mexico Peanut Growers Association.

Water Quality

Population growth along New Mexico's river valleys is among the fastest in the nation, resulting in a greater demand for domestic use of surface and groundwater supplies. Conflicts between urban use and irrigated agriculture are becoming critical issues. Population concentrations along the rivers also threaten water quality by increasing pollutants from septic tanks, household hazardous waste, and lawn and garden practices. There is a general lack of knowledge about the impacts to water supplies from land use and waste disposal practices. Educational programs designed for Extension agents, the general public, municipal water and wastewater managers, and garden hobbyists will increase awareness of the need to conserve and protect water resources.

Forage Fiber Tradeoff — Piñon-Juniper Woodlands

The purpose of this project is to analyze the impacts of dispersed recreation on public lands to test whether income from recreation can offset losses of extractive industries (livestock grazing, timber, and mining). This project shows where and how industry (ranches) expenditure patterns affect the New Mexico economy by sectors.

Integrated Weed Management for NM Rangeland

This project's goal is to determine the relationship between changes in mesquite densities and soil textures and depths. Because of the native plant and animal changes occurring in the desert regions due to increasing human populations, natural reserves will be established to protect this fragile ecosystem from further development.

Human Nutrition

There is a well-established connection between diet and health. Spiraling health care costs have catalyzed a change in emphasis toward preventing chronic diseases (e.g., heart diseases, cancer, osteoporosis) instead of treating them once they develop. Growing evidence indicates that increased intakes of vitamins A, C, and E, the B-vitamins, carotenoids, calcium, selenium, magnesium, zinc, chromium, phytochemicals and foods rich in these and other nutrients may help prevent such diseases and improve the health of Americans. These purported benefits have led to the widespread consumption of these nutrients in the form of diet supplements (e.g., vitamins, minerals, botanicals and other phytonutrients) and the emphasis on increased intake of fruits, vegetables and grains.

The information derived from this multi-state, interdisciplinary research project and the dissemination of information to both the scientific community and lay public will provide part of the framework on which future nutrient recommendations can be based.

Family and Work Linkages

Communities and businesses are struggling to adapt to change in the workforce. This project investigates how individuals regard themselves in their multiple roles, determining to what extent issues of identity and sense of self are key components of the well-being of individuals and families as they respond to social and economic changes.

Water Policy and Economics

Two major issues that impact on the effective and efficient allocation of water among multiple uses and users have emerged to the forefront of the policy debate. First, a growing body of evidence indicates that water conservation acquired through traditional cost-share conservation programs such as those implemented by USDA, 74% of whose participants are small farms, will likely be insufficient to meet the needs of growing non-agricultural water demands, particularly for environmental purposes. In this connection, nearly 81% of irrigated farms in the 17 western states are small farms, while large farms (farms with $250,000 or more in total farm sales) apply 66% of agricultural water. Clearly, the studies suggest that farm-size characteristics, economics, and institutions are central to the design of more effective federal and state water conservation policy. While traditional cost-share conservation policy likely contributes significantly to small farm policy goals, integrated conservation/institutional policy may have an even larger conservation/reallocation impact and provide for a more effective balance between small farm and environmental policy goals. Second, the historic method of reducing agricultural production risks through subsidized federal crop insurance (e.g. crop insurance and non-insured crop assistance provided by USDA) does not cover water shortfalls in irrigated agriculture. Even if federal crop insurance were extended to cover water-supply restrictions, it is an open question whether such a program could effectively mitigate the risks of reduced water supplies, because several concerns arise related to the feasibility, effectiveness, and participation level within such a program.

Plant Genetic Resource Cultivation and Utilization

In response to the negative impacts of biotic and abiotic variables on crop production, a broad genetic base is critical for U.S. agriculture in the development of new cultivars or the improvement of existing ones. These genetic resources are readily recognized as important and crucial in the agricultural production system as water, air, soil, and minerals. NMSU scientists are characterizing and evaluating germplasm by using morphological characteristics and molecular marker technology to enhance conservation management, increase utilization of the germplasm collections, and to incorporate the resulting genetic data into publicly accessible databases. They also are evaluating interactions of key associated pathogens, and/or symbionts to improve management and utilization of plant germplasm collections, and conducting research on selected germplasm collections for response to, or relationship with, close organismal associates such as microorganisms, pathogens, and saprophytes.

Root-Knot Nematode Genetics

Losses in US major crops due to plant-parasitic nematodes are estimated to be as high as 25 to 40 percent. This project is characterizing genetic variation in nematode populations and its influence on the success of alternative nematode management strategies. Transfer of information as guidelines to growers, pest control advisors, commercial and public plant breeders, and seed company personnel will involve the development of written materials, along with a computerized database that can be accessed centrally.

Cotton Genetics

Large germplasm populations are utilized to select via pedigree breeding elite lines possessing improved agronomic and fiber quality traits. The best genetic stocks are released for further development by the cotton industry.