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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A1. Planned Programs—Agricultural Experiment Station

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.

The New Mexico Agricultural Experiment Station believes that it is meeting the short-term goals outlined under Goal 1 in the 5-year Plan of Work submitted in July 1999. Research outputs take a number of forms:

- 52 refereed journal articles
- 46 non-refereed publications, reports, technical papers
- 107 proceedings, published abstracts
- 5 refereed Experiment Station bulletins and reports
- 10 Extension publications
- 31 invited presentations
- 18 education programs, field days, tours
- 12 books and chapters
- 2 patents/plant variety protections
- 25 M.S./Ph.D. programs completed

Outputs, outcomes, and impacts: Highlights of research at New Mexico State University:

① 'NuMex Garnet,' a new release from this program has high extractable red color. For the extracting industry in the state, this cultivar is more economical to grow than the standard cultivars grown.

② NMSU researchers released two mild habanero chiles varieties: 'NuMex Suave Red' and 'NuMex Suave Orange.' These new peppers are less spicy than a New Mexican green chile pepper, allowing one to taste the peppers' exotic flavor without burning their mouths. Major food processors like Campbell Soup Co. and H. J. Heinz Co. have requested planting updates on the mild habaneros.

③ A study conducted at the Corona Range and Livestock Research Center evaluated supplements varying in undegradable intake protein (UIP) content with or without addition of propionate salt to young postpartum beef cows. The results suggest young cows receiving supplements higher in UIP with or without propionate salt can recover sooner from body weight nadir while producing more milk. The largest variable cost in

the cow calf industry is non-grazed feed (or purchased feed). In New Mexico, 600,000 beef cows will be affected by improved supplementation formulas with reduced costs of at least $2 per head.

④ New Mexico State University scientists are breeding a new bloodline of desert-adapted cows specifically selected for harsh range conditions. The new bloodline will be called the New Mexico State University Line 1 Brangus. The new Line 1 Brangus program has the potential of becoming economically and environmentally significant for the cattle-producing states surrounding New Mexico.

⑤ Irrigated pastures are grown on approximately 160,000 acres in New Mexico, and are the second most prevalent irrigated crop in the state. Because pastures have traditionally produced low or negative returns, studies are underway to evaluate irrigated pasture production alternatives in an effort to increase potential profitability.

⑥ Alfalfa plants have been co-transformed with gene constructs for both the methionine-rich zein genes and the CGS enzyme gene from corn; these plants should determine if co-expression of the two genes will have a bigger impact on the methionine content of forage legumes. Improvement in the methionine content of forage legumes will have a great impact both on the yield of milk and the quality of wool.

⑦ NMSU scientists introduced extra copies of genes encoding a key enzyme in nitrogen assimilation (glutamine synthetase) and demonstrated improved performance (increased growth) by the model legume, *Lotus japonicus*. Improving the efficiency of nitrogen utilization in plants would result in using less nitrogen fertilizers. A decrease in the use of nitrogen fertilizers would lead to less chance of polluting the ground water with the toxic nitrates. A decrease in the amount of fertilizer use also implies less energy consumption to produce the fertilizers.

⑧ NMSU scientists have evaluated over 500 alfalfa populations in multiple year trials under limited irrigation to identify populations demonstrating improved water use efficiency. Useful material has been identified and is being integrated into the alfalfa breeding program. Populations developed by our program are currently under evaluation around the state and are performing very well under both well-watered and suboptimum irrigation conditions. Laboratory-based research is also being conducted to identify genes that control drought tolerance so that researchers can more efficiently manipulate this important trait. Modest improvements (5 to 10 percent) in alfalfa's water use efficiency through identification of water-use efficiency varieties could save over 42 million cubic meters of water annually in southeastern New Mexico.

⑨ Initial results show higher cow and calf weights in conservatively stocked pastures than moderately stocked pastures. Forage production has been higher in conservative than moderate stocked pastures. Grazing use has averaged 33% in conservative stocked pastures and 47% in moderate 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 also allow forage plants to maximize their productivity and it may be more beneficial than grazing exclusion.

⑩ Studies continued relating to use of plastic mulches for squash. The information from this study should allow producers to increase water use efficiency on their plots.

❶ Evaluation of about 30 medicinal herbs in observational plots continued and new trials began on lavender planting date and variety evaluation. Information from these studies will permit small farmers and stakeholders in northern New Mexico to supplement their income with niche products.

❷ Projected 2002 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. 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.

Total expenditures for Goal 1 were $320,099 from Hatch Act and Animal Health appropriated funds. The number of full-time equivalents engaged in research for this goal was 20.49

Key Theme – Agricultural Competitiveness

Onion Program

a. Description of Activity

This program develops onion cultivars for growers in New Mexico. 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

Short-term:

- A Plant Variety Protection (PVP) application was submitted for the "NuMex Camino' onion cultivar.

Long-term:

- Open-pollinated, male-sterile, maintainer, and pollinator breeding lines were screened for disease resistance, bolting resistance, bulb yield, bulb quality, maturity dates, and bulb

color. 'NuMex' cultivars and other germplasm were screened for resistance to Fusarium basal rot using a seedling screening procedure and a mature bulb screening. Promising breeding lines and released cultivars were compared to commercial cultivars and experimental lines using variety trials at off-campus agricultural science centers. Hybrid lines were evaluated for disease resistance, bolting resistance, bulb yield, and bulb quality. These trials offered stakeholders the opportunity to observe cultivars under local conditions at two field days or other visits. Results serve as the basis for state recommended cultivar lists.

- Studies to determine narrow-sense heritability of bolting resistance, pink root resistance, Fusarium basal rot resistance, soluble solids, and percentage of single centers were conducted using several open-pollinated populations. Pink root-resistant cultivars reduce the need for pesticide use. Higher marketable-onion yields with less bolting means fewer "cull" onions will be left in the field. Improved productivity on the same acreage reduces development of new land. Disease resistant onion varieties reduce the need for crop rotation and production on disease-free land.

c. Source of federal funds — Hatch

d. Scope of Impact — State Specific

Chile Program

a. This program develops chile (*Capsicum*) varieties to keep the New Mexico chile industry competitive in the global market with improved cultivars and genetics. 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.

b. Impacts/accomplishments

- 'NuMex Garnet', a new release from this program has high extractable red color. For the extracting industry in the state, this cultivar is more economical to grow than the standard cultivars grown.

- NMSU researchers released two mild habanero chiles varieties: 'NuMex Suave Red' and 'NuMex Suave Orange.' These new peppers are less spicy than a New Mexican green chile pepper, allowing one to taste the peppers' exotic flavor without burning their mouths. Major food processors like Campbell Soup Co. and H. J. Heinz Co. have requested planting updates on the mild habaneros.

c. Source of Federal Funds — Hatch

d. Scope of Impact — State Specific

Key Theme – Animal Health

a. Description of activity

The Clayton Livestock Research Center focuses on the nutrition, health, and management of stressed calves, and factors that affect intake by feedyard cattle. Death loss and treatment costs associated with stressed calves likely exceed 150 million dollars per year. The research objectives is to better understand how to manage these calves with respect to nutrition and health so that losses associated with death, treatment, and poor performance might be reduced. Objectives with respect to intake by feedyard cattle involve trying to understand the factors that control intake, and how these factors can be used to improve production efficiency. The results of this research program can be applied throughout the feedyard industry on the High Plains of Texas, Oklahoma, New Mexico, and Kansas. New Mexico Agricultural Experiment Station researchers also are conducting trials to investigate acute and subacute disposition and effects of swainsonine (locoweed toxicant) in lactating ruminants and mature whethers. Locoweed is a plant endemic to the Western United States that has been documented to have potential impact on both immunocompetence and iron/copper metabolism, both nutrients being important for appropriate immune response in range livestock. Both nutrients also are affected by dietary intakes, stress, and environmental factors such as consumption of toxic plants.

b. Impacts/accomplishments

- Total iron levels were induced to decrease within the first 22 hours following initial swainsonine exposure, though serum unsaturated iron binding capacity was unaffected by swainsonine exposure, indicating that transferrin is not affected by swainsonine in sheep. Effects on serum ceruloplasmin after exposure to locoweed supports suppression of ceruloplasmin activity by swainsonine. Both ceruloplasmin and transferrin are glycoproteins destined for cell secretion providing support that subclinical effects of swainsonine intoxication may affect nutrient metabolism and ultimately animal production/health.

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/accomplishmentss

Short-term:

- A study conducted at the Corona Range and Livestock Research Center evaluated supplements varying in undegradable intake protein (UIP) content with or without addition of propionate salt to young postpartum beef cows. The results suggest young cows receiving supplements higher in UIP with or without propionate salt can recover sooner from body weight nadir while producing more milk. The largest variable cost in the cow calf industry is non-grazed feed (or purchased feed). In New Mexico, 600,000 beef cows will be affected by improved supplementation formulas with reduced costs of at least $2 per head.

Long-term:

- New Mexico State University scientists are breeding a new bloodline of desert-adapted cows specifically selected for harsh range conditions. The new bloodline will be called the New Mexico State University Line 1 Brangus. The new Line 1 Brangus program has the potential of becoming economically and environmentally significant for the cattle-producing states surrounding New Mexico.

- Recent research projects have utilized bypass proteins in an attempt to improve reproductive processes in the range beef cow. Use of these supplements has resulted in improved reproductive function as measured by percent females pregnant and earlier calving dates. Strategic use of supplements may provide an economically viable alternative to current supplementation strategies. Increasing calving rate 5% (to 92%) would result in an additional 27,000 head weaned or an additional 13.6 million pounds of calves weaned. Based on these figures the increase of 5% in calving rate would increase economic return approximately $10 million to New Mexico ranchers.

- Experiments on ewe reproduction show that either sponge or CIDR pessaries can be used effectively to synchronize estrus with no differences in pregnancy or estrous behavior. This has the potential to allow a single producer to increase lambing rates by 10 to 15 percent.

- The obesity gene product Leptin increases with adiposity and suppresses ruminant feed intake via receptors in the hypothalamus, in regions rich in both Neuropeptide Y (NPY, a potent stimulator of appetite and growth hormone (GH) secretion) and GH releasing hormone neurons. NMSU researchers have determined that NPY neurons express leptin receptors in sheep and that the estrogen zeranol stimulates secretion of GH and suppresses adipocyte expression of leptin. Based on this evidence, researchers hypothesize that leptin mediates the somatic signal of fat mass and is a critical part of the physiological process by which estrogen enhances secretion of GH. This information will be used to develop methodologies that will enhance lean tissue accretion in ruminants.

c. Source of Federal Funds — Hatch

d. Scope of Impact — Multistate Research
- with states AK, AR, AZ, CA, CO, HI, IA, ID, IL, IN, KS, KY, ME, MI, MN, MO, MT, NC, ND, NE, NV, NV, OH, OK, OR, SD, TX, UT, WA, WI, 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

Short-term

- Selected warm-season annual grasses and legumes sown in monocultures and intercrops were studied. While data are preliminary, it appears that photoperiod-sensitive, brown midrib, sorghum × sudangrass hybrids mixed with lablab bean will make a viable combination as an alternative to alfalfa for dairy forage.

Long-term

- Warm- and cool-season turfgrass screening trials are being evaluated at the Agricultural Science Center at Tucumcari to determine those grasses that are best adapted to New Mexico growing conditions. Some of the turfgrasses are new to the market and have not previously been evaluated in New Mexico. Screening of selected turfgrasses will identify adapted turfgrasses that contribute to aesthetic home sites and recreation areas.

- Because of its relative low water use requirements, cotton acreage is increasing in eastern New Mexico. Cotton varieties/cultivars and harvest management processes are being evaluated in an attempt to improve the profitability of cotton production in eastern New Mexico.

- Irrigated pastures are grown on approximately 160,000 acres in New Mexico, and are the second most prevalent irrigated crop in the state. Because pastures have traditionally produced low or negative returns, studies are underway to evaluate irrigated pasture production alternatives in an effort to increase potential profitability.

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

- Results directed at mineral nutrition and mineral stress on a diversity or ornamental crops exposed to southwestern USA semiarid growing conditions have revealed the following: 1) major re-evaluation of current hybrid bermudagrass nitrogen fertilization practice is needed in order to abate potential groundwater nitrate contamination, 2) fast-growing clones and species of woody ornamentals have been identified to maximize biomass and salt accumulation capacity when irrigated with saline municipal wastewater, 3) in young trees, high sodicity drastically alters root function, and 4) two alternatives to the heavy metal containing flower preservatives, calcium and 1-methylcyclopropene, show promise in extending vaselife of cut bluebonnets, a promising alternative cut flower crop in New Mexico. Identification of tree species and clones suitable for wastewater reclamation could allow not only environmental remediation, but also economic return for the grower. The results of the USDA/Mexico border projects appear to be promising and detail of profit obtained from pulpwood harvest will be made available. Extension of vaselife and production of high quality products remain as one of the top concerns of the New Mexico floral industry. Bluebonnets appear to have tremendous potential to improve crop diversification for small farmers in New Mexico and our work on bluebonnet vaselife extension will prove beneficial in delaying quality loss and reducing of product wasteage.

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

Short-term

- Alfalfa plants have been co-transformed with gene constructs for both the methionine-rich zein genes and the CGS enzyme gene from corn; these plants should determine if co-expression of the two genes will have a bigger impact on the methionine content of forage legumes. Improvement in the methionine content of forage legumes will have a great impact both on the yield of milk and the quality of wool.

- NMSU scientists introduced extra copies of genes encoding a key enzyme in nitrogen assimilation (glutamine synthetase) and demonstrated improved performance (increased growth) by the model legume, *Lotus japonicus*. Improving the efficiency of nitrogen utilization in plants would result in using less nitrogen fertilizers. A decrease in the use of nitrogen fertilizers would lead to less chance of polluting the ground water with the toxic nitrates. A decrease in the amount of fertilizer use also implies less energy consumption to produce the fertilizers.

- New Mexico Agricultural Experiment Station scientists have constructed a total of eight cDNA librairies of drought-responsive genes. Five libraries contain transcripts expressed in drought-stressed leaf: *Capsicum chinense, Phaseolus acutifolius, Trifolium purpureum Dactylis glomerata, Medicago sativa*. Two libraries contain transcripts expressed in drought-stressed roots: *Phaseolus acutifolius*, and *Medicago sativa*. One library contains transcripts expressed in drought-stressed stems: *Medicago sativa*. This information will be useful for future engineering of plant metabolism or marker-assisted selection to develop drought resistant crops.

Long-term

- A genetic transformation approach is being developed for bunching onion (*Allium fistulosum*) and bulb onion (*Allium cepa*). Transformation systems are being developed for chile peppers (*Capsicum annuum* and *Capsicum baccatum*), using various explant-regeneration systems and co-cultivation with *Agrobacterium tumefaciens* and *A. rhizogenes*. Improved drought and/or heat tolerance in crops should result in lower water costs, reduced production losses, and possibly increased production. Improved disease and pest resistance should result in lower production costs in fungicide and pesticide applications, and reduced production losses. Improved vegetable quality should result in a higher value of products.

c. Source of Federal Funds — Hatch

d. Scope of Impact — State Specific

Key Theme – Plant Germplasm

a. Description of activity

This research area focuses on germplasm, the basic resource for plant improvement. Major objectives are to: 1) increase the genetic diversity available for basic and applied plant science research, 2) increase the germplasm base of New Mexico's major crop species to reduce the chances of devastating crop losses due to either biotic or abiotic stresses, 3) develop and enhance unique germplasm resources to provide private and public breeding programs a greater array of elite germplasm for cultivar development, 4) improve germplasm to ensure systematic genetic advances of newly developed cultivars, 5) enhance specific plant and seed traits to permit alternative uses of the major crop species, and 6) provide unbiased data to New Mexico producers.

b. Impacts/accomplishments

Short-term

- In year 2002 approximately 150 alfalfa cultivars were evaluated over 10 trials at five agricultural science centers throughout New Mexico. In November of each year the forage yield results from all locations are collated and immediately analyzed. Summarized results have been published and made available to stakeholders. The information provided by these trials helps producers select the best alfalfa cultivars for their region to ensure high yields and good profits.

Long-term

- NMSU scientists have evaluated over 500 alfalfa populations in multiple year trials under limited irrigation to identify populations demonstrating improved water use efficiency. Useful material has been identified and is being integrated into the alfalfa breeding program. Populations developed by our program are currently under evaluation around the state and are performing very well under both well-watered and suboptimum irrigation conditions. Laboratory-based research is also being conducted to identify genes that control drought tolerance so that researchers can more efficiently manipulate this important trait. Modest improvements (5 to 10 percent) in alfalfa's water use efficiency through identification of water-use efficiency varieties could save over 42 million cubic meters of water annually in southeastern New Mexico.

- Chile wilt, manifested by foliar blight, stem blight, and root rot, is one of the most chronic and devastating diseases for New Mexico. Yield reduction costs New Mexico chile growers thousands of dollars a year. Introgression of resistance is progressing and resistant cultivars are on the horizon.

- Several new Acala cotton strains and 35 Bt Acala cotton lines (resistant to pink bollworm, (PBW)) were tested and selected for field performance and fiber quality. A reliable screening method for root-knot nematode (RKN) resistance in cotton was

developed and the quantitative genetics on RKN resistance was conducted to direct cotton breeding for RKN resistance. PBW and RKN cause 5-10% cotton yield loss annually in New Mexico. Developing and growing Bt Acala cultivars with RKN resistance could increase cotton yield and eliminate the input costs to control these pests in the state. For example, an RKN resistant variety alone can increase cotton yield of more than 7,000 bales with about 3 million dollars annually for New Mexico cotton growers. The dollar value for growing Bt Acala cottons can be doubled. Thus, a total of extra $10 million a year could be brought to New Mexico cotton growers by growing RKN resistant Bt Acala cottons.

- Several high-yielding Acala cotton strains were selected for field performance and fiber quality from the seed increase plots. Their resistance to Vertilcillium wilt disease was preliminarily evaluated in the yield trials based on the number of survived plants in the field. The Verticillium wilt disease causes 5% yield loss annually in New Mexico. Developing and growing Verticillium wilt resistant Acala cultivars could increase cotton yield of more than 7,000 bales with about 3 million dollars annually for New Mexico cotton growers. Its combination with RKN resistance in Bt Acala cottons can bring a total of extra $12 million a year to New Mexico cotton growers.

- Field data on heat tolerance, yield and fiber quality were collected from a cotton population comprising of 97 recombinant inbred lines, while DNA markers are being generated for the purpose of QTL mapping on heat tolerance and agronomic traits. Yield could be increased 5 to 10 percent by developing Acala and Pima cotton cultivars with substantial heat tolerance and high water-using efficiency. Therefore, an extra of $3 to 6 million a year could be realized for New Mexico cotton growers.

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 soil-borne disease in irrigated agriculture.

b. Impacts/accomplishmentss

Short-term

- Two strains of curly top virus were found infecting a variety of weed hosts and chile and singly or in combination in infected plants. The leafhopper vector of curly top virus exists year round in southern New Mexico, with populations increasing in April and decreasing in August-September. Understanding the epidemiology and virus biology of curly top virus infection of chile will help researchers devise strategies to protect chile

plants from this disease that commonly causes production losses of 30% or more from chile fields.

Long-term

- Research has established that wilt disease in chile pepper is not caused only by *Phytophthora capsici*. Researchers have surveyed fields in counties in southern New Mexico and found that all fields visited had plants infected with *Verticillium dahliae*, a fungus which lives in soil and causes wilt in several crops, including chile pepper. This fungus was also harbored by weeds such as spurred anoda, wright groundcherry, and devil's-claw. Understanding the disease reservoirs will improve the ability to protect chile, cotton, peanuts, and onion crops in New Mexico.

c. Source of Federal Funds — Hatch

d. Scope of Impact — State Specific

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 conservative than moderate stocked pastures. Grazing use has averaged 33% in conservative stocked pastures and 47% in moderate 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 also allow forage plants to maximize their productivity and it may be more beneficial than grazing exclusion.

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/accomplishmentss

Short-term

- A new alfalfa variety trial was planted in fall 2001; the first two harvests were taken in 2002 and are being included in the 2002 New Mexico Alfalfa Variety Test Report. This information will be used by small producers in northern New Mexico to select varieties suited for their location.

Long-term

- A perennial forage grazing study was completed; the data are being analyzed. The information from this study will allow researchers to recommend grazing schedules on small farms in northern New Mexico.

- Studies continued relating to use of plastic mulches for squash. The information from this study should allow producers to increase water use efficiency on their plots.

- Evaluation of about 30 medicinal herbs in observational plots continued and new trials began on lavender planting date and variety evaluation. Information from these studies will permit small farmers and stakeholders in northern New Mexico to supplement their income with niche products.

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

- Drought tolerance of seven landscape tree species, including Mexican elder and bigtooth maple, has been determined. Research indicates that certain species of oak have more

potential for survival in drought environment that commonly used landscape species. The results of this research will be made available to public policy makers to help them determine effective ways to conserve water in the outdoor landscapes. This should help reduce the amount of water applied to managed landscapes, provide landscape personnel with alternative plant materials. Cost savings could range from $5 to 8 million a year.

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 microirrigation technologies; and 2.) to promote appropriate microirrigation technologies through formal and informal educational activities.

b. Impacts/accomplishments

Short-term

- The Growth-Irrigation Scheduling Model (GISM) model was developed and tested based on measurements made on a *Pinus brutia* var. *eldarica* experiment conducted at Las Cruces, New Mexico. Based on the modeled and measured data analysis, the GISM model can be a useful tool to: a) predict tree growth and schedule irrigations for *Pinus brutia* var. *eldarica* and *Cupressus sempervirens* plantations, b) understand the trees' response to environmental and water stress, and c) provide better analyses of future research efforts. The climate-driven variables (temperature and rainfall) needed by the model are readily available for most locations in the world from the National Climatic Data Center. The model can be used to scheduling irrigations using wastewater and minimize the amount of nitrogen that reaches the ground water. Protection of groundwater is a world-wide goal.

Long-term

- Studies at the Agricultural Science Center at Farmington show that well-managed drip irrigation has the capability to deliver exact amounts of water and nutrients to meet crop demands. Deep percolation is reduced or eliminated, preventing environmental contamination. The results of these studies can be transferred to other semi-arid areas that are experiencing water shortages and groundwater contamination due to over applications of water and nutrients.

c. Source of Federal Funds — Hatch

d. Scope of Impact — State Specific

Key Theme – Commodity Marketing

a. Description of activity

In many states, producer marketing efforts are supplemented through state-sponsored promotion programs. The focus of this program is to evaluate the effectiveness of these commodity promotion and other producer-funded/supported programs.

b. Impacts/accomplishments

- A study was begun to evaluate the effectiveness of New Mexico's state sponsored promotion programs "Taste the Tradition" and "Grown With Tradition." Results will be used to determine future promotion program strategies.

c. Source of Federal Funds — Hatch

d. Scope of Impact — State Specific

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 1.) to develop cost and return estimates on historical and projected bases for crop and selected livestock enterprises and farms in New Mexico; 2.) to provide cost and return data for use in other research projects when needed; and 3.) to develop accurate data on the cost of ownership and use of farm machinery and equipment in New Mexico.

b. Impacts/accomplishments

- Projected 2002 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. 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

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

Overview

The New Mexico Agricultural Experiment Station believes that it is meeting the short-term goals outlined under Goal in the 5-year Plan of Work submitted in July 1999. Research outputs take a number of forms:

- 6 refereed journal articles
- 3 non-refereed publications, reports, technical papers
- 3 proceedings, published abstracts
- 1 Extension publication
- 1 M.S. program completed

Total expenditures for Goal 2 were $14,971 from Hatch Act funds. The number of full-time equivalents engaged in research for this goal was 0.92.

Key Theme – Food Quality and Safety

a. Description of activity

This research area focuses on the quality and safety of foods by developing improved processing technologies and packaging environments.

b. Impacts/accomplishments

Short-term

- Standardized recipes for both red and green enchilada-type sauces and several other chile-based products have been developed with appropriate pH levels for water bath canning at home. Home preservation is an important cost-effective means of extending the shelf-life of perishable and semi-perishable foods. Development of formulations for green and red chile-based products that can be safely water bath canned will reduce waste from spoiled produce and decrease the chances of foodborne illness and related health care costs.

Long-term

- DF-200 HF, a Sandia National Laboratories product developed to be both a fire extinguishment foam and a decontaminant, was found to greatly reduce bacteria in farrowing facilities. If proven to be cost effective, DF-200 HF decontamination foam could be a viable means for sanitizing of farrowing crates.

c. Source of Federal Funds — Hatch

d. Scope of Impact — State Specific

Goal 3: A healthy, well-nourished population.

Overview

The New Mexico Agricultural Experiment Station believes that it is meeting the short-term goals outlined under Goal 3 in the 5-year Plan of Work submitted in July 1999. Research outputs take a number of forms:

- 4 refereed journal articles
- 7 Extension publications
- 5 invited presentations
- 8 education programs, field days, tours
- 1 M.S. program completed

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.

Key Theme – Human Nutrition

a. The aim of this research program is to improve human food consumption patterns to provide for a healthy, well-nourished population.

b. Impacts/accomplishments

- Through this research a calcium-specific food frequency questionnaire for Asian, Caucasian, and Hispanic-American adolescents has been developed for use by other researchers and practitioners interested in assessing calcium intake among these youth. Based on the focus group research, the team has also developed and tested the reliability of a motivator/barrier questionnaire to ascertain factors that serve to encourage or discourage intake of calcium rich foods among youth in these ethnic groups. This tool will also be valuable to researchers.

- The importance of parental factors, especially the mother, were identified as affecting food preferences, especially among younger adolescents. This finding will help nutritionists design programs to encourage good nutrition in young people.

- Pecans in diets were shown to decrease LDL-cholesterol by six to ten percent in test groups. The general public may see the health benefits of lower LDL-cholesterol levels by eating pecans as a part of a healthy diet. This will have beneficial effects on health care costs if the risk of heart disease is lowered.

c. Source of Federal Funds — Hatch

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

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.

The New Mexico Agricultural Experiment Station believes that it is meeting the short-term goals outlined under Goal 4 in the 5-year Plan of Work submitted in July 1999. Research outputs take a number of forms:

- 35 refereed journal articles
- 43 non-refereed publications, reports, technical papers
- 68 proceedings, published abstracts
- 4 refereed Experiment Station bulletins and reports
- 3 Extension publications
- 10 invited presentations
- 4 education programs, field days, tours
- 12 books and chapters
- 7 M.S./Ph.D. programs completed

Outputs, outcomes, and impacts: Highlights of research at New Mexico State University:

① Laboratory and greenhouse phytoremediation (the use of plants to clean up the environment) experiments were conducted on uranium-contaminated soils to determine if the addition of manure and other amendments would enhance plant uptake of the toxic metal. The results are still being analyzed, but have implication for remediating heavy metal-contaminated soils and handling animal wastes from dairies in the state.

② Progress has been made on developing effective propagation protocols for many woody plant species that can be used in disturbed land restoration/rehabilitation. Work also has been conducted on identifying those species inherently adapted to various disturbance conditions, including extreme alpine conditions and sites with low-productive soils. The results of this research benefits four of New Mexico's leading industries: livestock, forestry, mining, and horticulture-nursery. In terms of the first three industries, this research program relates to environmental compliance in developing more effective and less costly means of site rehabilitation and/or site management. In terms of the horticultural nursery industry, the techniques being developed will allow this industry to provide a wider array of native plants to the market at a lower cost.

③ Results of a study examining the effects of the insecticide Lorsban, used for pink bollworm control on non-target cotton arthropods, indicate that repeated applications of Lorsban have very little impact on non-target pests and beneficials in southern New Mexico. This impact is particularly interesting for beneficial arthropods, as the majority of their populations appeared unaffected. This is likely due to the numerous alfalfa fields in and around Mesilla valley. Alfalfa harbors many of these beneficial insects, and the close proximity of many of these fields to cotton appears to allow quick repopulation.

④ 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. The chemical analysis of soil and plant parts has not been completed. The information from this project will lead to more efficient use of nitrogen fertilizer, allowing producers to save money and reduce fluctuation in yield between on and off years. Also, with more efficient use of nitrogen fertilizer, less ground water pollution (nitrate) and less air pollution (nitrogen oxides) will result from production of pecans.

⑤ A technique was developed to quantify the ratio of pesticide deposited on the upper and lower sides of pecan leaves specifically for control of pecan aphids. Pecan aphids feed only on the lower sides of leaves; therefore, any pesticide deposition on the upper sides of leaves is wasted. Preliminary deposit data indicate that spray droplet size-total spray volume can be manipulated to increase pesticide deposit on the lower side of pecan leaves where aphids are present. The manipulation of droplet size and total spray volume can optimize pesticide deposit on the target area, reducing waste and environmental contamination.

⑥ Recent research examined three new potential programs for interstate coordination of surface water withdrawal and reservoir operations for their potential in reducing economic losses resulting from water shortfalls in periods of severe and sustained drought, such as the one facing New Mexico beginning in early 2001. Results showed that virtually zero water would be saved and there would be essentially zero economic benefit. This means that the cost of technologies needed to implement these increased irrigation efficiencies would have to be virtually zero to justify such investments economically.

⑦ A news letter was published by the New Mexico Climate Center and a PDF file of the news letter is at http://weather.nmsu.edu/news.htm. The use of climate information supports policies, programs technologies, and practices that protect, sustain, and enhance water, soil, and air resources. The calculators and spreadsheets are being used by farmers and agricultural consultants. Monetary decisions are based on climate analysis.

⑧ Researchers continue to receive and archive daily satellite images of the Mesilla valley and are using the CAHE aircraft to take aerial infrared photographs of selected areas. Preliminary studies have showed that infrared photographs can monitor plant development and reveal problem areas. Site-specific crop and pest management

technologies using remotely sensed data and computer-based-management systems should greatly reduce production costs.

Total expenditures for Goal 4 were $294,845 from Hatch and McIntire-Stennis Act appropriated funds. The number of full-time equivalents engaged in research for this goal was 25.93.

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 groundwater and surface water contamination.

b. Impacts/accomplishments

- Progress has been made communicating with the state environment department regarding optimum application rates to protect water quality. Challenges are being made to the current water quality control commission regulations for the environmentally-sound use of lagoon water and manures, because most regulations would promote the over-use of synthetic sources of nitrogen to make up for deficiencies imposed by improper application of manure. This research program has contributed to the development of best management strategies currently available for regulatory compliance and farm profitability in western states. This program also can benefit nutrient management planners that offer assistance to dairies and feedlots that dispose of manure and wastewater. Implementing the findings from this research can prevent fines that are levied against animal feeding operations to the amount of $1,000 to $10,000 per day for violations in permit requirements, and could save $1,000,000 or more in costly groundwater cleanup programs to mediate nitrate contamination.

- Laboratory and greenhouse phytoremediation (the use of plants to clean up the environment) experiments were conducted on uranium-contaminated soils to determine if the addition of manure and other amendments would enhance plant uptake of the toxic metal. The results are still being analyzed, but have implication for remediating heavy metal-contaminated soils and handling animal wastes from dairies in the state.

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

- Two new cooperative agreements were initiated, one with the Office of Risk Assessment and Cost-Benefit Analysis (ORACBA) of the USDA, and the other with USDA-APHIS. The ORACBA agreement funds research on risk analysis for biological control agents released to control invasive weeds. This project will use as a case study a chrysomelid beetle that is being considered for release to control salt cedar. The APHIS agreement funds research on the potential for application of population viability analysis (PVA), commonly applied to the assessment of threats to endangered species, to assess the potential effectiveness of control and management measures for invasive species. The focus of both projects is on quantitative models, 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.

c. Source of Federal Funds — Hatch

d. Scope of Impact — State Specific

Key Theme – Biological Control

a. Description of activity

This research program focuses on understanding the mechanism of differential feeding by insects on locoweed (*Astragalus* and *Oxytropis* spp.), which should help better target biological control agents with locoweed susceptible to the agent, thus increase the efficiency of this management tool. Another aspect of this program is to evaluate genetic variation among various locoweed varieties to find markers for susceptibility to biological control agents.

b. Impacts/accomplishments

Short-term

- NMSU scientists have determined that swainsonine content varies within and between genera suggesting that a working knowledge of locoweed varieties could be important as a tool for locoweed management, a weed that causes losses of more that $100 million annually to the livestock industry in the western U.S. By optimizing an alternative method of managing weeds, less herbicide will need to be used.

Long-term

- Researchers are testing the hypothesis that feeding by a root-feeding moth *(Walshia miscecolorella)* may reduce the density of the toxic rangeland weed (*Oxytropis sericea*).

The chemical swainsonine causes physiological and morphological abnormalities in domestic cattle, sheep, and horses. The effects from swainsonine poisoning result in economic losses that exceed $234 million annually in the United States. While broad-scale chemical control, even of isolated patches of locoweed, is viewed negatively by most of the landowners with infestations, biological control options have been welcomed.

c. Source of Federal Funds — Hatch

d. Scope of Impact — Multistate Research
- AS, AZ, CA, CO, GU, HI, ID, KS, MT, WY

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/accomplishmentss

- Progress has been made on developing effective propagation protocols for many woody plant species that can be used in disturbed land restoration/rehabilitation. Work also has been conducted on identifying those species inherently adapted to various disturbance conditions, including extreme alpine conditions and sites with low-productive soils. The results of this research benefits four of New Mexico's leading industries: livestock, forestry, mining, and horticulture-nursery. In terms of the first three industries, this research program relates to environmental compliance in developing more effective and less costly means of site rehabilitation and/or site management. In terms of the horticultural nursery industry, the techniques being developed will allow this industry to provide a wider array of native plants to the market at a lower cost.

- Preliminary trials have been completed which examine the carbon distribution in pinon-juniper ecosystems. This information will be used to parameterize and assess carbon cycling models developed for other, related ecosystems.

- Data derived from past and current research on these sites has been incorporated into a number of projects. Currently under design is a sustainable rural development project in with South Central Mountain RC&D Council to develop a large scale juniper thinning operation to rehabilitate watersheds in Central New Mexico to improve water quality and yield, increase forage, and improve wildlife habitat. The project will incorporate pinion

and juniper growth curves and economic benefits to set harvest cycles for producing juniper and pinion wood chips that feed a biomass electrical generation system for five communities. Research on seedling regeneration will allow land managers to incorporate physiological responses to varying levels of canopy thinning into long term management plans which enhance the life and effectiveness of the initial treatments and thus maximize economic returns to investment.

e. Source of Federal Funds — McIntire-Stennis

f. Scope of Impact — State Specific

Key Theme – Global Climate Change

a. Description of activity

The goals of this program are to understand prehistoric vegetation changes and natural cycles of desertification, and to determine if CO_2 is released into the atmosphere from soil carbonate in an arid region of southern New Mexico. These goals are accomplished by measuring rates of erosion recorded by sedimentary deposits, and vegetation change based on soil isotopes. Subsequent studies will focus on rangeland management that can curtail CO_2 losses from carbonate and promote carbon sequestration in vast areas used for grazing in the United States and similar dryland regions of the world.

b. Impacts/accomplishments

- Researchers have finished mapping and digitizing the landforms and soil parent materials of the Jornada Experimental Range and Chihuahuan Desert Rangeland Research Center located in southern New Mexico. These maps will be published in an Oxford University Press book on the Jornada Long-Term Ecological Research site, and also will be made available to the public via the Jornada Experimental Range web site. In addition to providing information about the geomorphic nature of the Chihuahuan Desert in southern New Mexico, these maps are being used to (1) correlate soil-vegetation relationships at the landscape scale, (2) compare historic and prehistoric erosion, and (3) identify ecologically fragile regions. This information will allow land managers and policy makers to more fully understand and predict the consequences of human interactions with the environment at global and regional scales.

- Scientists completed a study of carbon isotopes in termite galleries and determined that termites do not modify $\delta\ ^{13}C$ signatures in soils used to reconstruct prehistoric vegetation patterns. The data exclude termites from being directly involved in carbon sequestration by the use of atmospheric CO_2 to generate soil inorganic carbon.

- Data show pulses of CO_2 after rain. To discern whether the CO_2 is from dissolution of carbonates or plant and microbial respiration, we have taken gas samples once each month for carbon isotope analysis. These samples are stored in vials and will be analyzed this spring using a mass spectrometer. Plant types and their abundance have been

measured for each of the study sites. These data will be included in a Ph.D. dissertation, published in referred scientific journals, and made available to the public via the Jornada LTER web site.

c. Source of Federal Funds — Hatch

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

Short-term

- NMSU scientists have developed a pest management program for suppressing cotton boll weevil populations both before and during eradication programs. This program is based on research on overwintering habitats, and microclimate effects under various management practices. It capitalizes on New Mexico's natural advantage of having an arid climate and uses cultural controls and precise timing of insecticide applications to minimize control costs and environmental impacts. The boll weevil research and suppression efforts were responsible for saving millions of dollars in the Pecos Valley of New Mexico between 1998-2001 through reduced insecticide applications and yield losses.

- Results of a study examining the effects of the insecticide Lorsban, used for pink bollworm control on non-target cotton arthropods, indicate that repeated applications of Lorsban have very little impact on non-target pests and beneficials in southern New Mexico. This impact is particularly interesting for beneficial arthropods, as the majority of their populations appeared unaffected. This is likely due to the numerous alfalfa fields in and around Mesilla valley. Alfalfa harbors many of these beneficial insects, and the close proximity of many of these fields to cotton appears to allow quick repopulation.

- A Texas strain of *Trichogramma* was colonized at the NMSU Biological Control Insectary and released multiple times in 2002 to facilitate establishment. This parasitoid wasp attacks and helps control pecan nutcaseborer.

- The lacewing *Chrysopa cubana*, new to New Mexico, was reared and released multiple times for the control of pecan aphids.

- A study is being conducted testing the effectiveness of the insecticide Surround® for controlling the pecan aphid complex. Information from this study will improve efforts to control aphids that cause serious economic loss in pecan orchards.

- Data from experiments testing the insecticides permethrin and zetacypermethrin and mixtures of the two along with piperonyl butoxide suggest that synergism is high between these compounds, which translates into the same number of flies being controlled with lower levels of the compounds. In addition, mixtures prove effective in countering high levels of resistance and/or potentially delays the onset of resistance.

- Researchers are examining the impact of various management practices on pest and beneficial arthropod populations, and are developing a pest management program to control some of our major crop insects on alfalfa, pecan, and cotton. For example, saving an insecticide application on the 300,000 acres of alfalfa would save New Mexico producers an estimated $6 Million per year. If just 10 percent of the acreage was spared an insecticide application the savings would be $600,000 per year. There would be additional impact from the added value of higher yields.

Long-term

- Studies continue monitoring the seasonal activity, dispersal, and management of stable flies in New Mexico dairies. Stable flies in dairies pose a threat to the health, well-being and productivity of animals. Direct losses to the dairy industry due to stable flies are estimated to be in the millions each year.

c. Source of Federal Funds — Hatch

d. Scope of Impact — Multistate Research
   - with States AL, AK, AZ, FL, GA, IA, KS, KY, LA, MN, MT, NE, NY, OK, TN, TX

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. The chemical analysis of soil and plant parts has not been completed. The information from this project will

lead to more efficient use of nitrogen fertilizer, allowing producers to save money and reduce fluctuation in yield between on and off years. Also, with more efficient use of nitrogen fertilizer, less ground water pollution (nitrate) and less air pollution (nitrogen oxides) will result from production of pecans.

c. Source of Federal Funds — Hatch

d. Scope of Impact — State Specific

Key Theme – Pesticide Application

a. Description of activity

The focus of this research program has been to: 1.) characterize and improve delivery systems for pest control agents with special emphasis on non-conventional materials; and 2.) quantify the relationships between physical parameters and efficacy of different delivery systems.

b. Impacts/accomplishments

- A technique was developed to quantify the ratio of pesticide deposited on the upper and lower sides of pecan leaves specifically for control of pecan aphids. Pecan aphids feed only on the lower sides of leaves; therefore, any pesticide deposition on the upper sides of leaves is wasted. Preliminary deposit data indicate that spray droplet size-total spray volume can be manipulated to increase pesticide deposit on the lower side of pecan leaves where aphids are present. The manipulation of droplet size and total spray volume can optimize pesticide deposit on the target area, reducing waste and environmental contamination.

- A popular plastic aircraft spray nozzle was evaluated to determine how wear affected the flow rate and droplet spectra produced by the nozzle. These nozzles are currently used on approximately 70% of United States registered agricultural aircraft. As a result of this study, operators of agricultural aircraft can be confident that while plastic nozzles are subject to increases in flow rates as they wear, there is little change in the spray quality produced by the nozzles that might contribute to spray drift.

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

- Research has revealed that stream morphology was not negatively affected by any treatment—stream width/depth ratios, Gini coefficients, and change in cross-sectional area were unaffected by level of grazing intensity or season of use. Effects of season of use appeared to be significant on herbaceous species richness (i.e., number of different species) and Simpson's diversity index. Enclosures grazed during the cool season had the greatest species richness and diversity. Information from this research program will assist land managers and stakeholder determine grazing levels to protect riparian areas in the arid southwest.

c. Source of Federal Funds — Hatch

d. Scope of Impact — State specific

Key Theme – Soil Quality

a. Description of activity

This program is focused on remediation of lands contaminated with depleted uranium, mostly from military use of depleted uranium munition.

b. Impacts/accomplishments

- Laboratory and greenhouse phytoremediation (the use of plants to clean up the environment) experiments on uranium-contaminated soils are being conducted to determine if the addition of manure and other amendments would enhance plant uptake of the toxic metal. The plants take in uranium in their tissues. The plants are then harvested, removing the uranium from the site. The plants and uranium are then reprocessed or disposed of, which is a inexpensive way of decontamination.

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

Short-term

- Recent research examined three new potential programs for interstate coordination of surface water withdrawal and reservoir operations for their potential in reducing economic losses resulting from water shortfalls in periods of severe and sustained drought, such as the one facing New Mexico beginning in early 2001. Results showed that virtually zero water would be saved and there would be essentially zero economic benefit. This means that the cost of technologies needed to implement these increased irrigation efficiencies would have to be virtually zero to justify such investments economically.

Long-term

- Outside Santa Fe, New Mexico, experimental watersheds were established that will be cleared of piñon-juniper vegetation after two years of baseline study to determine effects of tree clearing on runoff and sediment yield. A study was begun near Mora, New Mexico, to determine runoff and sediment yield effects of clearing small diameter ponderosa pine stands. With better understanding of land management effects on runoff and water quality, pollution source areas can be targeted directly. This makes water quality improvement more efficient and economical for public agencies.

- A study was begun along the Rio Grande River to determine effects of seepage from acequias and irrigation ditches on shallow groundwater quantity, shallow and deep groundwater quality, riparian vegetation, and river flow. Information from this study should provide improved watershed management techniques for stakeholders.

- Progress has been made in the capability of extrapolating individual watershed results to a national scale. This is important to effectively characterize long-term changes in water supply related to possible climatic changes. Research continues to improve the capability of these models to indicate preferences for water resource and institutional development, and to link these models with important water use sectors such as agriculture.

- Progress was achieved in developing a taxonomy of reliability concepts and their conceptual relationships. More work is needed to develop useful measurements to meaningfully reflect differences in reliability. This is important because there is no consensus on how to define and measure reliability in the context of long-term supplies.

c. Source of Federal Funds — Hatch

d. Scope of Impact — Multistate Research

- CA, CO, CT, GA, IA, KY, LA, ME, MI, MN, MT, ND, NH, NV, NY, OH, OR, PA, SC, TX, WA, WV, WY

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

- A news letter was published by the New Mexico Climate Center and a PDF file of the news letter is at http://weather.nmsu.edu/news.htm. The use of climate information supports policies, programs technologies, and practices that protect, sustain, and enhance water, soil, and air resources. The calculators and spreadsheets are being used by farmers and agricultural consultants. Monetary decisions are based on climate analysis.

c. Source of Federal Funds — Hatch

d. Scope of Impact — State Specific

Key Theme – Wildlife Management

a. Description of activity

This program focuses on sustainable management practices for wildlife in the Chihuahuan Desert ecosystem.

b. Impacts/accomplishments

- Several research projects were begun to study: (1) the spatial distribution of breeding burrowing owls in Janos, Chihuahua, Mexico, (2) the influence of habitat fragmentation on wintering grassland birds in southern New Mexico, (3) effects of three different forest thinning practices on Sacramento Mountain Salamander populations, and (4) influence of resource manipulations on winter avian abundance, diversity and community dynamics in Chihuahuan Desert grasslands. Continuing projects include studies on the influences of seed distribution on a wintering Chihuahuan Desert avifauna; habitat associations of a winter Chihuahuan Desert avifauna; burrowing owl nesting strategies in urban and grassland habitats in southern New Mexico; and demographic/reproductive surveys of oryx (gembok) populations and their predators. These studies will provide better understanding of the distribution and ecology of vertebrate fauna of this region, including permanent resident species and seasonal migrants. As a result, we will be better able to sustainably manage our native vertebrate fauna. Data collected for this project can also help alleviate future entanglements related to the management needs and status of

specific species. It will also contribute to enhanced wildlife viewing and sustainable populations for fee hunting.

c. Source of Federal Funds — Hatch

d. Scope of Impact — State Specific

Key Theme – Invasive Weeds

Starthistle Program

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.

b. Impacts/accomplishments

- Studies have shown that picloram resistance in yellow starthistle is conferred by a single recessive allele. Yellow starthistle infestations are growing throughout the western United States at a rapid pace, causing loss of grazing land carrying capacity as well as serious damage to non-grazed land and recreational areas. Proper management should help reduce the economic impact this weed will have in NM. Because this weed has evolved resistance to a major class of herbicides used for its control, it may be much more expensive to control, unless we understand how to avoid resistance development in NM.

c. Source of Federal Funds — Hatch

d. Scope of Impact — Multistate Research
  - with states AZ, CA, FL, HI, IN, KS, NV, NY, OR, UT, WA

Key Theme – Invasive Weeds

African Rue Program

a. Description of activity

This research program focuses on understanding the life history characteristics and environmental constraints on reproduction and establishment of African rue. 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

- African rue (Peganum harmala L.) is a non-native perennial shrub currently expanding its range in the western U.S. Results of greenhouse experiments indicate that African rue is capable of rapid germination in warm, wet conditions. More limited germination events may be expected when soil temperatures are below 25 C but soil moisture is maintained for several days. Seed priming from small precipitation events may decrease average time to germination during periods of favorable temperature and moisture conditions. Drought tolerance of seedlings could have important implications for African rue's ability to invade adjacent areas. The ability of water-stressed seedlings to recover function following water stress suggests that recruitment of new individuals may occur despite short-term drought conditions. This information will allow range managers new insights into control of this invasive plant species.

c. Source of Federal Funds — Hatch

d. Scope of Impact —State Specific

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

Short-term

- Problems of geo-registration and image calibration have been addressed, making it possible to monitor plant development by comparing images using standard change analysis procedures.

- Recent acquisition of a spectroradiometer allows the collection of data on plant reflectance signatures. This will provide better information for interpretation of aerial and satellite data.

Long-term

- Researchers continue to receive and archive daily satellite images of the Mesilla valley and are using the CAHE aircraft to take aerial infrared photographs of selected areas. Preliminary studies have showed that infrared photographs can monitor plant development and reveal problem areas. Site-specific crop and pest management technologies using remotely sensed data and computer-based-management systems should greatly reduce production costs.

c. Source of Federal Funds — Hatch

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.

The New Mexico Agricultural Experiment Station believes that it is meeting the short-term goals outlined under Goal 5 in the 5-year Plan of Work submitted in July 1999. Research outputs take a number of forms:

- 14 refereed journal articles
- 21 non-refereed publications, reports, technical papers
- 8 proceedings, published abstracts
- 12 Extension publications
- 46 invited presentations
- 55 education programs, field days, tours
- 2 books or book chapters
- 2 M.S. programs completed

Total expenditures for Goal 5 were $45,295 from Hatch Act funds. The number of full-time equivalents engaged in research for this goal was 5.025.

Key Theme – Children, Youth, and Families at Risk

a. Description of activity

The focus of this program is on the providing support for New Mexico School-age Child Care Program Directors. Collaborations occur with other agencies to provide workshops and seminars as needed.

b. Impacts/accomplishments

- A library was maintained of resources that New Mexico School-age Child Care Program Directors can borrow. Mailings were made to alert them of available materials. In addition, a newsletter was published. The economic impacts of this project are evidenced when parents are able to work due to the availability of school-age child care. These programs allow for continuous, uninterrupted transitions for the children from the school to child care, thus allowing parents to remain on the job with a sense of security. In some cases, school-age child care allows the parents to further their educations, thus increasing their employability.

c. Source of Federal Funds — Hatch

d. Scope of Impact — State Specific

Key Theme – Parenting

a. Description of activity

The short-term goal of this program is to decrease negative parenting practices and increase positive parenting practices among high-risk families of young children. The long-term goal is to decrease adolescent substance abuse and other risky behaviors.

b. Impacts/accomplishments

- Nurturing Parenting classes were offered in schools, community centers, public housing, health clinics, and teen parent programs in Las Cruces, Doña Ana Village, Sunland Park, Anthony, and Hatch, New Mexico. Pre- and post-test data were collected from parents using the Adult-Adolescent Parenting Inventory and the Nurturing Quiz. Significant changes were found in 4 areas: (1) greater knowledge of effective discipline techniques; (2) decreased belief in the value of corporal punishment; (3) less reversal of parent-child roles; and (4) fewer inappropriate expectations of children. Every $1 spent on prevention of problems saves the state $7 on intervention services. Decreasing the number of youth who engage in risky behavior through family strengthening programs saves the state money. The families who graduate from the project are less likely to commit child abuse, and their children are much less likely to engage in risky behaviors during adolescence.

c. Source of Federal Funds — Hatch

d. Scope of Impact — State Specific

Key Theme – Technology Transfer, Relevancy and Impact In Agricultural Education

a. Description of activity

This program focuses on 1.) validating the "Agricultural Mechanization in the Secondary Agricultural Education Curriculum Model" with New Mexico agricultural education teachers; 2.) determining predictive factors for adopting technology education in New

Mexico public schools; and 3.) assessing research projects, Extension/technology transfer programs, and educational activities at New Mexico State University's agricultural science centers.

b. Impacts/accomplishments

- A study was made of the safety status of New Mexico secondary agricultural mechanics facilities. The results will be used to improve safety in these teaching facilities.

c. Source of Federal Funds — Hatch

d. Scope of Impact — State Specific

Key Theme – Other (Policy Analysis)

a. Description of activity

This project focuses on 1.) developing and refining economic models and methodologies in Western States to analyze public land issues; 2.) assessing the social impacts of public land policies on selected communities and households in western states; 3.) identifying the constraints to policy alternatives mandated under existing and proposed federal legislation and policy; and 4.) continuing to support the Policy Analysis Center for Western Public Lands through membership on the Science Advisory Team and Project Teams.

b. Impacts/accomplishments

- This research addressed public land policy issues with specific application to protection of the greater sage-grouse under the Endangered Species Act. Economic impacts are estimated using economic models that project ranch level and regional impacts when policies change. Linear programming models that estimate how ranch production would change were estimated for five areas including counties in New Mexico, Idaho, Nevada, Wyoming, and Oregon. Land use policy decisions can now be made with better information about what the projected impacts will be to ranch families.

c. Source of Federal Funds — Hatch

d. Impact — Multistate Research
    - with states CA, CO, ID, NV, OR, UT, WA, WY

A1. Planned Programs—Cooperative Extension Service

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

Overview

New Mexico Cooperative Extension has a tremendous role in helping to keep New Mexico's agricultural economy strong particularly in light of because of international border competition issues. Drought and water fights, 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.

These efforts require a continuous flow of appropriate information and technology to address local needs. 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, economic and environmental costs. Determining these factors requires a coordinated, team approach within the College and among researchers and Extension faculty.

The New Mexico Cooperative Extension Service believes that it is meeting the short-term goals outlined under Goal 1 in the 5-year Plan of Work submitted in July 1999. Extension outputs over the past year have taken a number of forms:

37 refereed publications
56 non-refereed publications, reports, papers
45 proceeding, published abstracts
187 Extension publications, videos, CD, DVD's
397 news releases, newsletter articles, radio/TV sound bites
97 invited presentations
347 education programs, field days, tours

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.

Outputs, outcomes, and impacts: Highlights of Extension programs at New Mexico State University:

Key Theme – Agricultural Competitiveness

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 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/accomplishmentss

Over 300 list serve articles were transmitted to county agricultural agents in the state, over 35 news articles through agricultural communications and submissions to the Plant Sciences newsletter, over 25 sound bytes for use on the radio and one television interview on hay supplies and demands in 2002. Some of the articles that were used the most included those on alfalfa production; cotton production; alfalfa replanting limitations; and silage production. Articles found and distributed on to county agents included: climate forecasts and demands on crops; profitable production strategies; niche crops; biotech crop use; new herbicide and crop seed registrations for the area; grain segregation; pink bollworm and boll weevil programs and needs; efficient water use in crops; farm bill effects on crop production; use of moisture metering or different irrigation systems for efficient crop production.

The agronomic crops program is important in that the three top crops of alfalfa, cotton and corn commanded over 270,000 acres, 73,200 acres and 130,000 acres in 2001 (top three crops are about 473,200 acres) and in 2002 are now poised at about 260,000, 67,000 and 130,000 acres (about 457,000 acres) for an estimated value of $184,000,000, $28,000,000 and $36,000,000 for over $248,000,000 in the state (dollar estimates from 2000). Other crops such as wheat ($11,000,000), sorghum (over $3,000,000), cottonseed (just under $5,000,000) and peanuts (just over $16,000,000) in the state contribute even more (around an additional $35,000,000) to the state's income. Other hay than alfalfa also contributes (around an additional $17,000,000 with about 90,000 acres) to the state income and this figure does not include all pasture grazing on grass crops utilized within the state. These figures show that the need for an outreach educational program for agronomic crops (contributing in all about $300,000,000) in the state is required for the state university to meet the criteria demanded of the institute by the state's constituency which establishes the need for university educational programming. The profitability aspect and integrated pest management, which goes hand in hand with the row crops program also adds to the demand for a state and several regional agronomists for New Mexico. Water use, reuse and efficient use is a top priority with both rural and urban clients throughout the state, affecting all people in New Mexico and will determine New Mexico's future.

c. Source of federal funds -Smith Lever 3(b)(c)

d. Scope of impact -State Specific

Key Theme – Agricultural Competitiveness

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

The Chile Pepper Task Force initiated an industry publications series called "Chile Task Force Reports"; it has currently published reports on strategic planning, mechanical harvesting, and best management practices.

The Chile Pepper Task Force hired a professional agricultural engineer to coordinate its mechanization projects. In addition, new engineering projects have been initiated with Sandia National Laboratories and the NMSU College of Engineering.

The Chile Pepper Task Force received funding from the New Mexico Department of Agriculture to enhance technology transfer with growers and processors through the use of handheld PCs.

Without the above efforts by the Chile Pepper Task Force, the chile pepper industry in New Mexico would be less effective in its efforts to reverse the detrimental affects of NAFTA and the World Trade Organization on chile production in New Mexico. It is estimated that the work of the task force has aided greatly in the retention of continued cultivation of over one third of NM's production of small acreage chile.

c. Source of federal funds - Smith Lever 3(b)(c)

d. Scope of impact - State Specific

Key Theme – Animal Production Efficiency

Profitable Livestock Production

a. Description of activity

New Mexico livestock producers have a need for educational and service programs to

assist them in maintaining viable economic and sustainable livestock production systems. The Profitable Livestock Production Practices effort includes numerous state, regional and county workshops, field-days, short-courses, meetings and demonstrational research efforts in which various livestock production practices are discussed and/or evaluated.

b. Impacts/accomplishmentss

Animal specialists continue to contribute to a monthly column in the *New Mexico Stockman* magazine titled "Aggie Notes." This monthly column was created for the Extension Animal Resources Department to broaden the scope of livestock producers that the university typically reaches, and to provide all readers with timely educational information. This publication reaches approximately 6,100 New Mexico residents and 4,000 residents of neighboring states.

Animal Resource Department specialists coordinate the New Mexico State University and Texas A&M University Ranch to Rail program, in cooperation with beef specialists from Texas A&M University. The 2001-2002 New Mexico Ranch to Rail entries totaled 197 steers from 17 ranches across New Mexico. Results from the second year revealed that the average net return was a $41 per head loss, with average return per head from each of the 17 ranches ranging from a $311 loss to a $41 profit. Additionally, steers that got sick in the feedyard netted $183 less than steers that stayed healthy. This information has been incorporated into Extension educational programs and presentations by state specialists and county extension agents. In the past two years, 350 calves have been tested through this program.

Beef cattle specialists have worked cooperatively to develop a New Mexico Beef Quality Assurance (BQA) certification program. A Beef Quality Assurance Task Force (BQATF) was developed with representation from all segments of the cattle industry. The BQATF serves as an advisory board to NMSU regarding future BQA efforts. The New Mexico Livestock Board agreed to serve as a third party certifying agency for this program. County Extension Agents and beef specialists have trained approximately 200 producers, with approximately 40 taking the necessary steps to become certified. A cooperative effort with Langston University in Oklahoma has resulted in two successfully funded grants from the Food Safety Inspection Service totaling approximately $30,000 to fund this program.

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. Beef cattle specialists continue to coordinate the New Mexico SPA program. Workshops were held in Tucumcari, Silver City, and Las Vegas, New Mexico. Additionally, one-on-one SPA meetings were held with four individual cooperators. During the past three years, the SPA database for New Mexico has increased from 10 to 33 herds.

The Cattle Growers' Short Course is the largest statewide annual Extension-sponsored educational event for the beef producers of New Mexico. Beef cattle specialists coordinate this annual event. Approximately 200 producers attended the 2002 event.

Livestock specialists assist with conduct of both state and regional livestock shows at county fairs in the state. Specialists serve as superintendents, announcers, and assist with planning and carrying out shows at these events. These efforts give specialists a unique opportunity to interact with many producer and non-producer individuals.

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 provide 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 Beef specialist conducted a small-scale demonstration of methods to add value to cull cows. This demonstration project was very successful and yielded an average net return greater than $200 per head in less than 55 days. Results of this demonstration have been presented in New Mexico and Arizona at beef producer meetings. Additionally, the results motivated a large New Mexico ranch to allow New Mexico State University to use 154 cull cows to continue researching cull cow management and marketing. All 154 cows were placed on feed at the Clayton Livestock Research Center to evaluate three nutrition management protocols and two marketing methods, plus the performance of cows was evaluated based on cow age. Results were presented at the Extension Symposium of the Western Section of the American Society of Animal Science in June, 2002.

In response to New Mexico Beef Producers' need for information about cattle marketing options, a demonstration project was conducted to measure the opportunity cost of managing cattle to enter a "natural" niche-market channel. Many niche market alliances pay a premium for cattle that do not receive growth-promoting implants and (or) have not been fed feed additives such as ionophores and antibiotics. However, previous research indicates that the cost of production is significantly increased when growth promoting implants and feed additives are not included in fed-cattle management. Results from this demonstration project indicate that a premium of $4.26/cwt is necessary to offset the opportunity cost associated with not implanting steers in the feedlot. Findings from this project have been incorporated into educational programs across the state, and were presented to the Western Section of the American Society of Animal Science in June, 2002. These research findings are presented in a manuscript that has been submitted, and is currently being reviewed by, the American Registry of Professional Animal Scientists.

Extension specialists conducted an on-ranch demonstration project comparing two estrus synchronization programs in beef heifers. It was demonstrated to Catron County producers that the SelectSynch estrus synchronization protocol was superior to the Target Breeding protocol, and that androgenized cows are not a viable estrous synchronization substitute to the HeatWatch technology. Results of this study were presented to the

Western Section of the American Society of Animal Science in June, 2002, and will be published (currently in press) in the American Registry of Professional Animal Scientists.

In response to many questions from range livestock producers regarding mineral nutrition programs, specialists coordinated a mineral survey of all 23 geographic subregions in New Mexico. Information gleaned from this survey has been used to demonstrate forage mineral content variation to producers and students, and to aid New Mexico State University in providing general mineral supplementation recommendations.

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

d. Scope of Impact -State Specific

Key Theme - Agricultural Profitability

Agriculture Marketing

a. Description of activity

New Mexico farmers continue to have difficulty obtaining adequate prices for their agriculture products. These prices are impacted by many variables from national agriculture policy to need for local buyers of New Mexico agriculture products. This program is carrying out a marketing education program to help farmers obtain adequate prices for their agriculture products, and to provide information on how to develop alternative markets for products produced in New Mexico.

b. Impacts/accomplishmentss

The economic impacts of this project total over $500,000 per year. As farm incomes improve because of better price information and the development of new marketing outlets, growers can retail their product directly to the public, which allows them to develop new year round customers.

c. Source of federal funds -Smith Lever 3(b)(c)

d. Scope of impact -State Specific

Key Theme - Animal Production

Efficient and Profitable Livestock Production

a. Description of activity

Many management practices can increase output and return. Few producers use all proven practices. A major concern of producers and consumers is production of a safe and wholesome human food supply, dictating an increased need for quality assurance programs. Extension and the New Mexico cattle industry participated in phase I of the Beef Quality Assurance Program in the past. Both cattle and sheep producers evaluated production costs and returns and incorporated production practices that would maximize dollar return. New Mexico has different cultural groups who have unique production problems. These include the numerous Indian cultures across the state and the Hispanic cultures of north-central New Mexico.

b. Impacts/accomplishmentss

As a result of these programs, 1,000 livestock producers benefited economically by increasing their net incomes and furthering their chances for survival in livestock-related businesses; 500 minor species owners increased the welfare and, where appropriate, increased income due to educational efforts and programs.

c. Source of federal funds – Smith Lever 3(b)(c)

d. Scope of impact – Multistate Extension (AZ, TX)

Key Theme - Invasive Species

Invasive/Noxious Weeds

a. Description of activity

Noxious brush and weeds are found in every county of the state and are a serious problem on New Mexico rangeland. The purpose of this program is to demonstrate the most efficacious methods of controlling and managing noxious brush and weeds on rangeland. Historically, 142 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.

b. Impacts/accomplishmentss

Three herbicide trials involving oak, willow, and Russian olive were evaluated in Quay and San Miguel counties. The respective county agent and the rancher operator or land management agency representative were present during the evaluation of most trials. This provided the opportunity to give in-the-field training on herbicide activity, symptoms and mode-of-action characteristics. The demonstration program was successful as a training tool. Results of the evaluations will be included in the 2002 Summary of Range Brush Control Research and Demonstration Trials in New Mexico.

A total of 9,100 acres of saltcedar were sprayed along the Pecos River in 2002. The program was coordinated with nine Soil and Water Conservation Districts in seven counties. Public meetings were conducted in each SWCD area.

Extension specialists helped execute the Pecos River Native Riparian Restoration Project (PRNRRP), which is the main objective of the non-profit Pecos River Native Riparian Restoration Organization (PRNRRO). PRNRRO is composed of representatives from five Soil and Water Conservation Districts, Carlsbad Irrigation District, and the Pecos Valley Artesian Conservancy District as Board of Directors. Also, 12 state and federal agencies and 20 private companies and organizations are ex-officio members and supporters of PRNRRP. The Brush and Weed specialist is the official representative from NMSU to PRNRRO. As such, this specialist has spent time promoting the project to interested groups around the state. Activities have involved a number of presentations to numerous groups, numerous interviews with media and other activities associated with the Project. Also, the specialist has provided technical assistance throughout the year concerning the scientific guidelines and public relations aspects of the project, including continued monitoring of the project.

The Brush and Weed specialist was involved in planning and coordinating the 2002 New Mexico Vegetation Management Association annual meeting held in Las Cruces. This Specialist served as program co-chair and local arrangements chairperson for the 2002 meeting. The 2002 meeting was attended by 130 stakeholders.

c. Source of federal fund -Smith Lever 3(b)(c)

d. Scope of impact -Multistate Extension (TX, CO, UT, AZ)

Key Theme - Invasive Species

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

As a result of this effort at least 3,000 individuals (urban residents, range and forest land owners, and agricultural crop producers) will gain knowledge on the identification, movement, and management of selected economic and environmental pests. Previous studies have estimated that at least fifty percent of learners will apply this knowledge. Statewide economic impacts predict that, as a result of increased control of invading pests and weeds, land owners could save as much as $500,000 over the next five years if at least 50% of learners applied their new knowledge to management and control techniques. This program supports a national effort to detect and suppress exotic pests and can influence the demand for New Mexico Agricultural products abroad.

c. Source of federal funds -Smith Lever 3(b)(c)

d. Scope of impact -State Specific

Key Theme - Plant Health

Plant Pathology

a. Description of activity

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).

b. Impacts/accomplishments

In FY 2002, 661 diagnostic services were provided. Services [diagnosis of submitted plant specimens (298), phone calls (211), field visits (21), and office visits (131)] were provided as requested by county agents, growers and the general public. A plant diagnostic record is created for each specimen submitted. The record discusses the diagnosis and treatment recommendations for the specimen and is given to the owner of the plant and to the county agent for their records.

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).

The Extension Plant Pathologist presented information at six workshops designed to provide continuing education units for licensed pesticide applicators. These workshops also provided information to agents, specialists, growers, landscapers, city employees and the general public. One hundred fifty-five people received training for pesticide applicator certification.

The Extension Plant Pathologist provided information regarding the occurrence of diseases and fungicide use in New Mexico for National Surveys on Cotton, and provided information on common fungi, bacteria, and virus diseases occurring in New Mexico for National Surveys.

Extension specialists provided plant disease information to agents, growers, and the general public on vegetable and specialty crops, with emphasis on Integrated Pest Management approaches to plant disease management. The information will permit stakeholders to control plant diseases with more environmentally-benign methods.

c. Source of federal funds -Smith Lever 3(b)(c)

d. Scope of impact – Integrated Research and Extension; Multistate Research/Extension (with states AZ, CO, GA, IN, KS, MN, MO, ND, OK, TX, WY)

Key Theme – Plant Production Efficiency

Pecan Production

a. Description of activity

The Southwest Pecan Project is studying three of the most important environmental issues facing pecan production. The first is the efficient use of water and the maintenance of acceptable water quality in southern New Mexico. The second is the wise use of agricultural chemicals including fertilizers, and pesticides. Work on the fate of fertilizers (especially nitrogen) and a more complete understanding of irrigation requirements will help increase the efficiency of water use and minimize any degradation of area water supplies.

b. Impacts/accomplishmentss

Research conducted to date has provided valuable data on optimum rates and timing of fertilizer applications and clues about the alternate-bearing property of pecans that is a perpetual problem in the industry. A window of only several days is available where pesticide treatment is effective against the Pecan Nut Casebearer (PNC). Research and extension activities have provided orchard managers with PNC treatment information.

The result of this effort has changed the perception of the PNC presence from that of a high, potentially devastating threat to one that is manageable and one that has a lower potential for severe impact in most years. Calculating water balance requires monitoring to be continued over several years. Preliminary analyses of these water balance measurements have been published.

c. Source of federal funds -Smith Lever 3(b)(c)

d. Scope of impact -Multistate Extension (AZ, TX)

Key Theme - Rangeland/Pasture Management

Range Management Education

a. Description of activity

The New Mexico Cooperative Extension Service conducts educational programs in range management with emphasis on resource monitoring and best management practices including grazing systems and vegetation manipulation. Conflicts over use invariably occur; the Cooperative Extension Service serves as a facilitator in conflict resolution. The Extension Range Management Program, through its range monitoring programs, strives to educate producers to make range management decisions based on sound information. These decisions will reduce resource damage and improve range conditions on public and private rangelands.

b. Impacts/accomplishmentss

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. These data provide information on which sound management decisions can be carried out.

The Range Management specialist, in cooperation with county Extension faculty, the Riparian Management specialist, and the Wildlife specialist, has conducted workshops that illustrate how to implement monitoring programs on individual ranches. This program is a program with three advancement levels: basic, intermediate, and advanced range monitoring. Schools are set up to teach the basics of range monitoring with participants establishing monitoring sites on their own ranches the second day of the workshop. The Cooperative Extension Service takes the lead in these workshops with Forest Service, Bureau of Land Management, State Land Office, and Department of Game and Fish supporting this effort.

Since 1992, NMSU faculty and USDA poisonous plant laboratory scientists have been working on the locoweed problem, specifically in Union and Colfax Counties, New Mexico. The range management specialist and the Union County Extension agent have been working toward assembling the latest research information to develop management strategies to reduce incidence of locoism. Poisonous plants inflict about a $2 million loss on the state's livestock industry annually. Direct losses are the most obvious, but indirect losses such as the loss of grazing land, lowered weaning weights, and lowered reproductive performance may be of a greater economic drain than death loss. Locoweed is the single most prevalent poisonous plant in New Mexico.

c. Source of federal funds -Smith Lever 3(b)(c)

d. Scope of impact -Multistate Extension (AZ)

Key Theme - Risk Management

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). A complete set of 2002 Projected Crop Cost and Return Estimates for New Mexico was released. Extension specialists answered questions from, and distributed approximately 2,800 copies to, more than 100 individuals to help them make economic decisions for their ranches/farms.

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

d. Scope of Impact -State Specific

Key Theme - Small Farm Viability

Specialty Crop Production and Marketing

a. Description of activity

In an effort to increase farm income, many farmers in New Mexico are turning to specialty crops that yield greater returns per acre. Greater returns, however, are often correlated with greater risk factors, particularly with new crops with limited track records. Production databases need to be developed for these new crops in a small plot environment before wider recommendations can be made so as to limit these risk factors. New techniques also have to be developed to curb the use of water and reduce inputs and environmental problems associated with pesticides and fertilizers. Lastly, new markets need to be identified for these crops and new value-added products need to be promoted to capture the interest of consumers.

b. Impacts/accomplishments

Growers were informed about the benefits of plastic mulches and other innovations in the production of specialty crops through three publications, a Horizon Live presentation on Organic Crop Production, two newsletters, three newspaper articles, six conferences or workshops and one tour. Over 500 kids, teachers and parents were informed about the benefits of drip irrigation and mulches in the production of native crops at a Kids, Kows and More program in Belen on May 2-3, 2002.

A study found that herb plots could reduce drip irrigation frequency when mulch was used, cutting water use by a third. The plants, however, tended to be smaller, probably due to a cooling of the soil. Weed growth was minimal in the mulch plots compared to the check plots. This information will permit growers to reduce the amount of water needed to successfully grow specialty crops. Water-saving techniques like mulches in the rural environment can also be applied to the urban environment resulting in increased water savings that can be returned to agriculture and less use of herbicides.

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

d. Scope of Impact -Integrated Research and Extension

Key Theme - Small Farm Viability

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

Extension specialists planned, coordinated and implemented a strategic planning session for the Northern New Mexico Small Farm Task Force. This effort was needed to obtain the most current information available as to the efforts the Cooperative Extension Service should address in serving the needs of northern New Mexico. The specialist worked with the agents from the Small Farm Task Force and obtained a diverse extension audience to participate in the planning session.

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 planned, developed and implemented a diverse agriculture workshop, which included local county agents, specialists and USDA Agency representatives. More than 50 stakeholders attended this two-day workshop from the Eight Northern Pueblo clientele and other local producers.

Specialists assisted the Eight Northern Pueblo's agent in conducting a prairie dog management control workshop along with a Rodox demonstration. A Rodox demonstration was also conducted on the Jicarilla Apache Reservation in August. The Rodox equipment is a device that disperses oxygen and propane into the rodent dens. The gases are ignited, causing an underground explosion that exterminates the rodents in their dens without the use of conventional poisons. More than 30 Taos Pueblo and Jicarilla Apache producers were in attendance.

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

d. Scope of Impact -Integrated Research and Extension

Key Theme - Urban Gardening

Urban Horticulture in New Mexico

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 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 initial training period and provided update and advanced training to Master Gardeners throughout the year.

The Extension Urban Horticulturalist 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 on KFLQ radio (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.

The Horticulturalist assisted and advised County Extension Agents regarding problems 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 - Multistate (CO)

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

Overview

New Mexico's Food Technology Program addresses promotion of regulatory compliance, food product development, food safety and nutrition education, and marketing of specialty food products. Specific audience targets include clientele in twenty-six of thirty-three counties consisting primarily of Anglo, Hispanic and Native American populations. A challenge in programming is to deliver education at several different levels of complexity, culture and language comprehension. Audiences range from youth and other non-technical audiences to multilingual populations to scientists, and members of the food industry.

The New Mexico Cooperative Extension Service believes that it is meeting the short-term goals outlined in the 5-year Plan of Work submitted in July 1999.

Total expenditures for Goal 2 were $20,974 from Smith-Lever Act 3(b)(c) appropriated funds. The number of state-level full-time equivalents engaged in research for this goal was 0.8.

Key Theme – Food Accessibility & Affordability

Multilingual Food/Nutrition Education

a. Description of activity

A majority of people need access to good quality, affordable foods. They can receive this information through educational programs on nutrition and healthy living through Extension programs. However, up until the last four years, 81% of Extension nutrition education programs were delivered in English. But research tells us that English-only programs do not always fill the needs of our growing minority-majority multicultural population. Therefore, multilingual (Spanish-English, Spanish only, and Navajo-English) videotapes, computer-based software, and print material nutrition education programs have been prepared and used by Extension and loaned to other agencies. The videotapes are particularly popular because of their 'telenova' format, realistic script writing and use of clientele as actors and actresses.

b. Impacts/accomplishments

Over 37 different curriculum teaching tools have been written, produced and employed since New Mexico's multilingual nutrition program began. These teaching tools have added an entertaining yet educational approach to creating interest with clientele. Programs are evaluated for effectiveness in teaching with target populations before being released for statewide use. Evaluations report that the video format is most popular, second are the computer tools (with those who have access to computers) and third, are the written instructions (with the exception of recipes that are more popular than everything else combined). An overwhelming 87% of clientele report they enjoy learning both basic food guide pyramid principles and viewing their lessons in the 'telenova'

format. The 1,324 pilot test clientele who reviewed thirteen new materials over the past year, report that they plan to adopt at least one new nutrition concept into their diets and the diets of their families and use at least one additional serving of vegetables after viewing teaching tools in the video, computer or written formats.

English only speakers reported a high level of satisfaction regarding the ease of use of multilingual teaching tools. Spanish-English speakers reported that 11% preferred learning in Spanish and thought the Spanish language was represented in an easy-to-use, popularly accepted format. Navajo users were not questioned about the Navajo and English options. They were asked if the Navajo language used was accurate. There was nearly 100% agreement by Navajo Native American clientele that the use of Navajo was accurate and clear. All pilot participants were asked if they felt money to produce multilingual materials was a wise investment. An 87% majority reported they felt it was a wise decision.

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

d. Scope of Impact – Integrated Research and Extension

Key Theme – Food Handling

Food Technology Program

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 that can lend themselves to unique food products and income producing commodities. Value-added food processing is beginning to generate a significant number of jobs and a return on economic investment. Food technology program objectives are to 1) provide food processors programs on producing safe food products, 2) teach state and federal regulations pertaining to food product development, 3) assist in developing and maintaining compliance with all food regulations, 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 knowledge transfer of food technology research, teaching workshops and responding to clientele questions.

Planning and design of the Extension Food Product Development Laboratory was completed this past year. The facility is developing into 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 space. The plans to have the lab up and in operation have taken longer due to unforeseen building

limitations requiring relocation of the laboratory to another facility.

b. Impacts/accomplishments

The new 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 (3-5 requests/mo), and microbial and chemical analysis - sodium content, microbial shelf-life, and water activity (3-4 requests/mo).

In addition to the lab, 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 developed in partnership with Extension). 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.

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

d. Scope of impact – Integrated Research and Extension

Key Theme - Food Safety

Family/Consumer Food Safety

a. Description of activity

Those most susceptible to serious consequences or even death due to foodborne 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, infant care givers, young children and the elderly, food service and restaurants workers and managers. Educational programs focus on safe handling, processing and storage of food. Programs are designed to create awareness of practices that increase the risk of food borne illness and to change behavior of participants.

The Food and Nutrition Specialist serves as a resource to and provides training for the Extension Home Economists in subject matter and serves as a state liaison between the Cooperative Extension Service, other agencies and organizations, and Extension's nutrition educators. Collaborating with several agencies has been a key in reaching targeted audiences. In addition, 4-H focuses on youth projects and activities related to food safety and food preservation. An Agricultural Communications Specialist (NMSU Agricultural Communications Department) has developed food safety video and web

games (http://www.fooddetectives.org/). Special attention is placed on cultural and language needs, low income needs, the elderly and infants and children.

b. Impacts/accomplishmentss

The Food and Nutrition Specialist in collaboration with Agricultural Communications continues to produce and distribute 1-2 food safety education multimedia (videos, CD-ROMS, print materials) statewide and nationwide each year.

Almost 2,000 food safety contacts were made by Extension faculty in 2002, either in person or on the phone. Education program participation, including individual contacts exceeded 30,787 this past year.

Coalitions, networks, and agency collaborations (including the New Mexico Environment Department, Albuquerque Division of Environmental Health, Bernalillo County Environment Department, New Mexico Beef Council, New Mexico Children, Youth and Families, New Mexico Livestock Board and New Mexico Restaurant Association) exceeded 93 different community, regional or state group partnerships.

Thousands were reached with research-based nutrition information via Extension newsletters, local newspaper, radio and TV stories and other media outlets.

A popular state and health fair hand washing information booth was used again this year. Food safety information was provided along with an interactive glow light hand washing activity. Approximately 1,500 children participated in the hand washing activity.

Adoption of safe food handling practices and an understanding food safety risks are evaluated in at least 50% of 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. Individuals (97.6%) receiving food safety education planned to adopt at least one new recommended food preparation skill, 92% said they are more aware now of the importance of protecting their families against food borne diseases, and 76% planned to adapt better post-meal refrigeration practices (12,110 surveyed).

The popularity of the Germ Detective curriculum used with elementary youth has remained high for more than a ten-year period. To date, it is estimated that over 79,000 NM youth have experienced the interactive glow light hand washing activity designed to teach proper hand washing with the same immediate response “Oh, uck!”

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. Participants (1,234) reported at the end of ‘the safe trail’ program having an increased awareness of food illnesses (96%) and the need to handle food safely (95%), were able to state at least one new step they will take in the future to maintain a

higher level of food safety (89%), and increased their understanding of how food diseases are spread (89.7%).

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

d. Scope of Impact – Integrated research and extension, multistate (CO)

Goal 3: A healthy, well-nourished population.

Overview

A healthy, well-nourished population is an important goal for modern society because if health issues are address, populations can turn their attention to increased productive social, economic and environmental concerns. Three health areas are still very prevalent in New Mexico. They are addressed in this section.

The New Mexico Cooperative Extension Service believes that it is meeting the short-term goals outlined in the 5-year Plan of Work submitted in July 1999.

Total expenditures for Goal 3 were $1,398,559 from Smith-Lever Act 3(b)(c) appropriated funds. The number of state-level full-time equivalents engaged in research for this goal was 1.5.

Key Theme – Health Care

Diabetes Education

a. Description of activities

In New Mexico, an estimated 105,000 people have diabetes. Approximately 35,000 of them do not even know they have it. Many of the state's citizens are at particular risk, because the disease is more prevalent in minority populations. Hispanics in the state are almost one and one-half times more likely than Anglos to die of diabetes, and Native Americans are more than five times as likely to do so, according to the Centers for Disease Control and Prevention.

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 teaching/awareness 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 for Extension Home Economists in subject matter and serve as liaisons between Cooperative Extension Service and other agencies and organizations.

Outcomes

Over 1,400 individual diabetes Extension education contacts were made this year. Over 25,000 est. outreach through newsletters, newspapers, radio, TV & other media. Over 5,000 were reached through other venues including cooking schools, support groups, diabetes lending libraries, health fairs, community seminars, and incorporation of diabetes information into ICAN classes, collaborations with other agencies. Ten Extension publications and one video were produced as educational resources.

b. Impacts/accomplishments

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 70% increase in the number who said they would begin to 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 Funding -Smith Lever 3(b)(c)

d. Scope of Impact – Integrated research and extension, Multistate (AZ)

Key Theme - Human Nutrition

Human Nutrition

a. Description of activity

There are some birth defects which are preventable, one is ‘neural tube defect’. If women take 400 mcg. of folate before they become pregnant, they can significantly reduce the chances they will have a baby with neural tube defects such as Spina Bifida. Cooperative Extension provided educational programs for childbearing women to make them aware of the need to take folate before becoming pregnant. Grant funds from the New Mexico Department of Health were combined with CYFAR funds to provide this prevention education program series. A statewide conference on Birth Defects Prevention was conducted for 20 County Home Economists, one Maternal & Child Health representative, and 2 County Nutrition paraprofessionals, from 18 counties in the fall of 2001.Resource

materials, which agents requested at the conference, such as educational curriculum kits, pamphlets, Community Action Kits, Baby Think It Over Dolls, Folate ribbons, and pill box key chains were procured and sent to 17 counties.

Another project, the Lifelong Happiness Grant Project, grew out of the currently reported Birth Defects Prevention Project. This program addresses 5 risk factors for birth defects. The Child Development & Family Life Specialist wrote the educational module which will be used as the intervention tool by 8-10 organizations in Chaves, Sandoval and Dona Ana County in 2002-2003.

b. Impact/ accomplishment

Birth defects prevention programs were held in 5 counties. In Grant County, a comparison of pretest and post test scores for 1,030 middle school and high schools students and 132 adults from 9 community groups showed that subjects improved their scores from 33% to 77%. When the females of childbearing age were asked what would help them take a vitamin with folic acid daily to prevent birth defects, 86% answered: encouragement or reminders from health professionals, low cost vitamins, and more classes like this. In Rio Arriba County, the Extension Home Economist who is also the County Director teamed with the Maternal & Child Health Council to train 12 volunteers to deliver 10 hours each of outreach activities on birth defects prevention programs.

In Santa Fe County, the Extension 4-H Home Economist trained 18 high school teachers on birth defects prevention programming. Teachers will in turn teach their students about preventing birth defects. Based on comparing pretests to post tests, the teachers increased their scores from 23% to 78%. In Dona Ana County, the Extension Nutrition Educator taught 19 Hispanic students at Gadsden High School the importance of folic acid in preventing birth defects. Based on pre and post test scores, the students improved their test scores from 53% to 79%. The McKinley County 4-H Home Economist taught weekly lessons to predominately Navajo middle school children on healthy lifestyles from January to May, 2002. Informal evaluations showed they learned how to refuse alcohol and tobacco, the need to eat nutritious foods and to take a multivitamin with folic acid daily.

c. Source of federal funds – Smith-Lever 3b & c

d. Scope of impact - Statewide

Key theme - Infant Mortality

Infant Mortality

a. Description of activities

In Lea County, a home visitation program for parents is conducted, before the baby is born and during the baby's first year of life. A home visitor, who is employed by Extension and is also a registered nurse, visits the homes of prospective parents. She conducts informal education with the parents regarding prenatal care, infant care, parenting skills, family goals, child development stages, and child abuse prevention. She documents progress of parents, follows them through the baby's birth, and through the postpartum process to ensure the baby's optimal development.

b. Impacts/accomplishments

All of the babies whose families were visited by the home visitor lived through childbirth and are thriving. Based on interviews by the home visitor and on a post survey administered to nine clients who completed the Home Visitation Program, 63% of clients reported a medium to high level of knowledge of prenatal care and postpartum knowledge. 50% reported a medium to high level of knowledge of infant care, parenting skills, and child abuse prevention. 100% of the clients reported they would recommend the program to their friends and 88% said the home visitor was helpful. Qualitative data from interviews with the clients show that clients feel the home visitor helped them feel more secure because they had someone to ask questions and turn to for assistance.

Qualitative data from the home visitor showed that the best time to begin visiting clients is 20 weeks gestation in order to form a bond. Some of the issues the home visitor dealt with were: clients feeling embarrassed to breast feed, clients giving tap water to infants, clients immersing infants in water before the umbilical cord fell off, Grandmas feeding sugar and regular food to infants under 5 months of age. A case study of one client showed that the physician in charge of her baby's birth gave credit to the home visitation program for the client's ability to give birth without complications. The home visitor showed birthing films, went over breathing techniques, and what to expect in labor with the client. This relieved stress in the mother and assisted her in the birthing process. Physicians, Nurse Practitioners, and personnel from the Health Department support the home visitation project by referring clients to the home visitor.

c. Source of federal funds – Smith-Lever 3b & c

d. Scope of impact - Multistate (TX)

Goal 4: An agricultural system that protects natural resources & the environment.

Overview

Both rural and urban human activities can pollute land, water, air, and food. Through teaching, research, and extension programs, the College is committed to furthering our understanding of human impact on the environment, and to supporting environmentally-sound agricultural and natural resource practices. The College will continue its efforts to understand the interaction between the environment and production agriculture.

New Mexico 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.

The New Mexico Cooperative Extension Service believes that it is meeting the short-term goals outlined in the 5-year Plan of Work submitted in July 1999.

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 research for this goal was 12.36.

Key Theme - Integrated Pest Management

a. Description of activity

The goal of this program is to make New Mexico crops more profitable. Extension is helping in this area by reducing insect damage and insect control costs, particularly for cotton, chiles, alfalfa, and pecans. Our project is addressing control in a number of ways including developing techniques that will dramatically reduce the cost of eradication. We are also developing low-no cost techniques to reduce pests through modification of habitats and growing conditions to increase desiccation in this desert environment.

b. Impacts/accomplishments

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. Extension specialists covered all major pest groups, arthropods, weeds, diseases, and nematodes attacking these two commodities, plus beneficial arthropods. The importance of area alfalfa fields as reservoirs for beneficial arthropods was stressed along with the importance of adequately protecting them from lethal agrichemical treatments. The 56 attendees rated the presentations and conference highly. 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. Information from this project will allow producers to manage insect pests more economically and in a more environmentally-friendly manner.

Extension specialists found very high levels of parasitism on insect pests in the Mesilla Valley of New Mexico—generally over 90 percent—while parasitism in the Pecos and middle Rio Grande valleys were very low generally—about 4 to 10 percent. Results of this research have been presented ESA meetings and at field days for stakeholders.

A project was started for demonstrating native blue orchard bees to apple growers in Northern and South Central New Mexico fruit production areas. Larger apple orchards in Idaho are included in the demonstration and testing phase, with evaluation objectives including insect performance and efficiency as well as economic aspects relating to their use. Blue orchard bees may be valuable alternative pollinators to the beleaguered honey bee, with its varroa mite, tracheal mite, and "Africanization" problems.

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

d. Scope of Impact - Multistate (ID, TX)

Key Theme - Natural Resources Management

Nursery Industry

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 accepted the position of Executive Director of the Southwest Turfgrass Association and helped organize their annual conference and trade show. He also lectured to more than 15 workshops and master gardener seminars on managing turfgrass. Along with 2 extension publications, these efforts helped to educate stakeholders on proper landscaping techniques using appropriate turfgrass cultivars.

A 40,000 ft^2 demonstration and research area at the NMSU golf course is being planned to examine different irrigation methods and root zone materials that affect water use efficiency, turf performance and water movement. This area 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.

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

d. Scope of Impact -State Specific

Key Theme - Natural Resources and 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

Conservation of native fishes has focused attention on the competing uses of limited water supplies. Irrigation diversions have been blamed for drying the river channel and for further fragmenting the river into upper reaches that are inaccessible to native fish occurring in lower reaches. However, conveyance channels for agricultural water could contribute positively to conservation of native fish in several ways. Therefore, external funding has been secured to determine if irrigation drains and ditches associated with irrigated agriculture could contribute significantly to conservation of sensitive native fish species in the lower Rio Grande Valley of New Mexico. Extension specialists are sampling and identifying the fish and other aquatic species occurring in the drains and delivery ditches of the Elephant Butte Irrigation District. Extension specialists also are studying the utility of acequia diversion structures in northern New Mexico for protecting native population of Rio Grande cutthroat trout, Rio Grande sucker, and Rio Grande chub. The funding also is supporting an international symposium and proceeding in 2003 on conservation of aquatic resources in arid lands to disseminate the results of the studies.

Field reconnaissance will underway to determine if significant differences exist following wildfire between areas that have been subjected to silvicultural treatments and those that have not been subjected to silvicultural treatments. Differences in vegetation characteristics also will be documented between treated and untreated forest stands that have been subjected to wildfire. Ultimately, this research will provide further understanding about treatment strategies to reduce the occurrence of catastrophic wildfires.

In corporation with the New Mexico Cooperative Fish and Wildlife Research Unit, Department of Fisheries and Wildlife Science at NMSU, and the New Mexico Department of Game and Fish, a short course was developed for the Commissioners on the New Mexico Game Commission. A variety of topics were covered in the short course. Topics included communication, wildlife ecology and management principles, aquatic ecology and management, and conflict resolution. All parties involved agreed that the short course was successful and will be provided again next year.

A study was complete evaluating foraging relationships between elk, mule deer, and cattle in the Lincoln National Forest. The objectives of this project were to provide greatly needed knowledge about livestock, elk, and mule deer interactions and lead to analytical tools that can be used to assist in natural resource management. Specifically, the information derived from this study allows inferences to be made about what habitat types these animals frequent the most at different times of the year. It also allows estimates of forage use for each habitat type during different times of the year.

In order to assess the amount of forage removed by wild ungulates, the Extension Wildlife Office developed a relatively rapid monitoring package that quantifies the amount of forage removed by wild ungulates over the growing season. The monitoring package is now being adopted the New Mexico Department of Game and Fish as a tool to determine to assess the amount of money to be paid for forage loss and depredation.

Because the number of participants in the New Mexico 4-H Wildlife Habitat Contest has greatly decreased, a study to evaluate this program was conducted in cooperation with the NMSU Agricultural and Extension Education department. Both descriptive statistics and qualitative analysis have been conducted on information gathered by the mail survey to develop appropriate changes to the existing program. The information from this study will be used to modify the state program and increase participation.

Extension Wildlife and Range Management specialists have helped mediate Section 8 consultation between permittees, U.S. Fish and Wildlife Service, U.S. Bureau of Land Management, and the U.S. Bureau of Reclamation regarding a livestock grazing permit along the Rio Grande River. The permittees had been subjected to several permit reductions based on potential habitat restrictions for the southwestern willow flycatcher (SWWF). The Extension Range Improvement Task Force was asked to provide scientific information regarding the effects of livestock grazing on SWWF habitat and the birds directly. Since the inception of this effort, approximately 15 meetings have been held to address and resolve the conflict between permittees and federal agencies.

A demonstration project has been completed in the Black Range District of the Gila National Forest to examine the effects on soil and vegetation resources of application of dairy manure to rangelands. Results suggest that light application of dairy manure can benefit rangelands and efforts are underway to expand the project to explore opportunities to restore degraded desert rangelands adjacent to NM dairies. This effort could be highly visible and help improve ecological conditions on NM rangelands as well

as help solve NM dairy producers' manure disposal problem. Vegetation, soil, and erosion responses to different rates of manure application continue to be explored.

As a result of the successful implementation of permittee range monitoring on 7 allotments, participants were able to avoid the risk of federal non-compliance, thus allowing participants to save approximately $511,896, the cost of leasing private land based on the permitted number and class of livestock for the full number of days.

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

d. Scope of Impact – Integrated Research and Extension; Multistate (AZ, MT, UT)

Key Theme - Pesticide Application

a. Description of activity

Pesticides need to be used in a precise, safe and judicious manner. The PAT program is the only one available that instructs in the basic information required to pass examinations for obtaining a certified pesticide applicators license. The Federal Insecticide, Fungicide and Rodenticide Act, administered by the United States Environmental Protection Agency and mandated by Congress, requires that pesticide applicators who use restricted-use pesticides be certified and licensed. It is the responsibility of the states to train and license these people. The New Mexico Cooperative Extension Service provides the necessary training to become licensed either through workshops, seminars, presentations or written study material provided to farmers, ranchers and other prospective pesticide applicators. A pesticide license is required to purchase the restricted-use pesticides to protect agricultural commodities, humans, and the natural environment from pests.

b. Impacts/accomplishments

The indicator of how the training is measured is the number of pesticide applicators becoming certified and licensed, and the number of complaints the New Mexico Department of Agriculture receives from the application of pesticides. In 2002, there were seven workshops that were attended by 258 commercial and private applicators. Of these 84 took examinations to become licensed as a pesticide applicator. Extension specialists are guest lecturers at pesticide applicators conference throughout the year. Also, there is an on-going master gardener training program that is taught by county agents and specialists, which deals with this issue.

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

d. Scope of Impact - State Specific

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

Seminars or discussions of riparian ecology and/or management were presented on 22 separate occasions. Eight of these were invited presentations to address riparian ecology and management and eight were invited presentation addressing riparian monitoring. The remaining six were meetings in which the Extension Specialist was requested to provide input relating to riparian management issues. Approximately 500 individuals, including ranchers, industry representatives, students, and state and federal management agency personnel participated in workshops or other forums where riparian management and monitoring techniques were presented, which will help these people make science-based, informed decisions regarding management of riparian areas.

A number of demonstration projects are currently being conducted and are available for outreach activities. In cooperation with County Extension faculty in Colfax and Union Counties, a demonstration project was initiated on the Chesney Ranch to illustrate techniques for improving livestock distribution, mitigating soil erosion, and improving water retention. By constructing earthen dikes across a seasonally flowing arroyo, reducing pinon and juniper encroachment, and providing improved livestock access to upland forage, soil erosion was slowed, soil moisture levels were increased, and upland riparian vegetation was improved.

A demonstration project was been initiated in the Black Range (Sierra County) of the Gila National Forest. Fourteen riparian pastures/exclosures were constructed to control livestock season of use and grazing intensity to determine and demonstrate the effects of managed grazing regimes on riparian vegetation. Information from this project will be used by stakeholders to better manage range areas.

A series of demonstration projects have begun, beginning with Catron County, to illustrate riparian monitoring techniques. Long-term data will be collected and compiled to evaluate the efficacy of riparian monitoring methodologies and health of riparian systems. The results of these efforts will be highlighted in Range Improvement Task Force and Extension publications.

A demonstration project is in its third year in the northwest corner of New Mexico. Floodplain development and riparian revegetation strategies under different livestock management regimes are being explored. Summer, winter, continuous, and no livestock grazing are being compared to areas that experience only wild ungulate grazing.

During the summer of 2000, work was initiated to prepare a riparian vegetation identification guide for New Mexico. A majority of the plants were photographed, described, collected, and placed in the herbarium for reference. Compilation of those photographs and descriptions to prepare a web-based identification guide has been underway since that time. The web page (http://www.cahe.nmsu.edu/riparian/) is now online and available to interested users. The list of riparian and wetland plants of New Mexico is extensive and efforts to complete the guide will be ongoing. It is anticipated that this effort will ultimately culminate in a hard copy vegetation identification booklet that will assist range managers.

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

d. Scope of Impact – Multistate (CO)

Key Theme - Water Quality

Quality and Quantity in the Rio Grande Corridor

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. 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.

b. Impacts/accomplishments

Extension specialists have facilitated the establishment of the New Mexico Chapter of the National On-Site Wastewater Recycling Association; assisted with training for Natural Resources Conservation Service (NRCS) Comprehensive Nutrient Management Planning Workshop to certify Confined Animal Feedlot Operations (CAFO) operators/consultants for compliance with EPA permits; contributed to the New Mexico Environment Department's State Water Quality Management Plan; coordinated activities by the NMSU Water Task Force; coordinated and presented water rights adjudications information for stakeholder producers and the general public; directed and coordinated the college-wide *Rio Grande Basin Initiative—Efficient Irrigation for Water*

Conservation project in cooperation with Texas A&M University; coordinated activities for implementation of *Watershed Basin Hydrology Modeling* project in cooperation with Agronomy and Horticulture faculty and Army Research Laboratory researchers; and provided several training workshops and environmental risk assessments for stakeholder groups.

Extension water quality programs have contributed significantly to increasing knowledge by New Mexicans in the areas of waste management, drinking water and human health, environmental restoration, nutrient and pesticide management, pollutions assessment and prevention, and watershed management. Water quality programming has had increased interest around the state, resulting in larger audiences, more group collaboration, and more public recognition of Extension's contribution in solving water issues. Program participants will accomplish safer and improved water quality by applying best management practices for water protection and remediation.

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

d. Scope of Impact – Multistate (TX)

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

Overview

Economic opportunity and quality of life vary greatly for New Mexicans. 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 many other unsatisfactory figures. Addressing the quality of life issues is a core piece in New Mexico Extension's educational efforts.

The New Mexico Cooperative Extension Service believes that it is meeting the short-term goals outlined in the 5-year Plan of Work submitted in July 1999.

Total expenditures for Goal 5 were $251,985 from Smith-Lever Act 3(b)(c) appropriated funds. The number of state-level full-time equivalents engaged in research for this goal was 6.4.

Key Theme - Child Care/Dependent Care

Child Care

a. Description of activity

There are 600 licensed childcare centers and 233 family day care homes in New Mexico, not including a large number of unregistered homes that care for young children. Because of low pay and no benefits, staff turnover is high, thus there is a need for continual staff

training. Extension helps to meet this need for training by conducting all day educational workshops, conducting surveys to assess child care providers' needs before programs are developed, setting up lending libraries and mobile libraries, disseminating directories of child care services to the community and sending newsletters to providers.

b. Impacts/accomplishments

Five counties reported conducting workshops for child care providers in 2001-2002. Quay County conducted 2 workshops in collaboration with the Child Care Training and Assistance Center. A total of 81 individuals attended both workshops. An estimated 40 in home providers were able to register with the Child and Adult Care Food Program as a result of acquiring the needed continuing education credits from the workshops. An estimated $5,999 in travel costs was saved by the providers because they could attend training close to their homes. Ninety percent of participants reported a knowledge gain after attending the training.

Santa Fe County used the Achieving High Quality Child Care curriculum to deliver training to eight providers. Bernalillo County also used this curriculum in two separate workshops to train 53 providers. Program evaluations showed that participants gained knowledge on topics of nutrition, safety, development, and child abuse prevention.

In Grant County, 181 individuals were taught basic parenting skills education, in collaboration with Western New Mexico University, La Familia, Families and Youth Inc, Children's Medical Services, County Library, Juvenile Probation Office, Southwest Advocates for Children. Subsequently, 15 day care providers used the training to apply toward licensing certification hours.

In Colfax County, three separate workshops were held for child care providers in collaboration with Luna Community College and the Colfax County Child Care Task Force. Based on a post survey, 96% of child care providers reported that the Caring For Children Training Workshop was beneficial and they increased their knowledge on child development, media violence, childhood illnesses, and child abuse prevention. Knowledge level before the training was 2.43 and after the training was 1.68 on a scale of 1, excellent to 4, poor. Thirty providers received 6 hours of continuing education credit toward their teaching certification for New Mexico child care licensing requirements.

The Colfax County Child Care Provider Directory was produced and disseminated to the community and 125 child care providers were sent the Caring for Children Partnership Newsletter. In Colfax County, 138 contact hours were made with providers and parents in the two hour sessions held twice weekly at the Lending Library and Computer Lab in the Children's Workshop. Based on log reports and descriptions, 67% of computer users were child care providers, who used the computer to search for information related to lesson plans and create documents for their child care related jobs. In Colfax County, 24 children and providers were reached by the Mobile Lending Library.

c. Source of federal funds – 3b & c

d. Scope of impact - Statewide

Key Theme - Children, Youth & Families at Risk

a. Description of activity

New Mexico Cooperative Extension administers the Children, Youth & Families at Risk Grant Project from CSREES. There are many activities being conducted under these grant goals. In Colfax County, a community coalition was developed to meet the needs of its community members who were at risk. The Long Term Care Facility in Raton donated 2 rooms to house the Safe House Interview Room for children. Prior to having the safe room, children and youth were taken to Taos, 100 miles away, for interviews. The community committee is working with the Maternal and Child Health Council as well as the Child Abuse Task Force to sustain the project by increasing communication with those who use the safe room and increasing the number of people trained to use the equipment.

In Santa Fe County, the Extension Home Economist partnered with the Food for Santa Fe Program to distribute healthy snacks for kids 3 to 12 years of age, who are homeless or low income. In Valencia County, the Extension 4-H Home Economist, taught 65 primarily Hispanic elementary school students tobacco abuse prevention for 2 hours a day, 2 days a week from February to April, 2002. In addition, she held a Kick Butts Day with the 65 students, 4-H members, and the High School Soccer Team. In Quay County, the Extension 4-H Home Economist delivered science, math, and reading curriculum to 40 youth in the Clover Club After School Program. In addition she delivered the Can We Talk parenting class.

b. Impact/ accomplishment

The Children's Safe House Interview Room was established in Colfax County's Long Term Care facility. It's purpose is to videotape interviews with abused and neglected children so that they need only tell their story once for the criminal and legal system. Seven people were trained to use the equipment and 24 children were interviewed from February to August, 2002. In Colfax County, a collaboration between Luna Community College and the Colfax County Child Care Task Force to provide child care provider training was established. In Colfax County, 12 Colfax County Child Care Task Force members held monthly meetings to collaborate on programs for families at risk in their community. They have expanded their CYFAR project work to the Colfax County Community Action Coalition and County Maternal and Child Health Council.

From June to September, 120 snacks per week were distributed to equal 1,920 health snacks distributed in the Food for Santa Fe Program. In addition, the project drew the attention of other agencies in the community who want to assist with the project. Based on pre and post tests, students in Valencia County increased their knowledge on Tobacco

Abuse Prevention. Based on informal discussions, 3 families in Quay County reported learning useful tools to use in starting discussions with their children.

c. Source of federal funds – Smith-Lever 3b & c

d. Scope of impact - Statewide

Key Theme –Community Development

Teleliteracy Assistance

a. Description of Activities

Business and community leaders in rural New Mexico communities are learning how to harness the Internet for local prosperity through workshops from New Mexico State University's Cooperative Extension Service. The workshops, presented in six rural NM communities with over 215 attendees as part of the Teleliteracy Assistance for Businesses and Communities (T-ABCs) project, were held this past year by Extension and NMSU's colleges of business and arts and sciences. Workshops provided detailed instruction for local businesses, government officials and individuals to begin tapping the Internet as part of their day-to-day operations. Whether you're a businessperson seeking to improve your competitive edge and your profits, a government leader who wants to enhance the efficiency of local services, or a citizen who wants more tools to broaden their horizons, these free workshops provided worldwide access without leaving their communities. The project's goal is to continue to provide rural communities with tools that enhance the quality of life for their citizens and increase local prosperity.

b. Impacts/accomplishments

NMSU Off-Campus Teleliteracy Learning Centers have been placed in 30 of the 33 county Extension offices, four of the six science centers, one of five Native American offices, and two of three district offices. They were all networked with T-1 lines, DSL, or wireless connections. The learning centers provide a place for individuals and business members to come and practice their Internet skills.

Workshop evaluations from participants told project developers not to stop. The top three areas that participants wanted more information on included strategies for high visibility in search engine results, business Internet marketing, and business web page design. The workshops included business-to business and business-to-consumer focuses. Participants comments included 'this information will help me to start moving my business online'; 'the electronic invoicing tips I learned will help to increase my sales at least 5% right off the bat'; and 'I'd like to find a way to get some of my customers involved with these trainings so they will better appreciate how secure and easy it is to buy from my business online'. Des Moines, NM participants felt the workshop's timeliness was perfect. They were wrote business plans and learned about what electronic tools to incorporate into that plan to increase revenues. Another stated that he just saved himself a lot of money just by

attending because he was about to pay a web developer for a job he learned he could do himself. Another stated that by attending, he gained the courage he needed to start a new rural business venture he'd be pondering for quite some time.

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

d. Scope of Impact -State Specific

Key Theme - Parenting

Baby's First Wish Newsletter Program

a. Description of activity

Baby's First Wish is an age-paced, developmental newsletter for parents of young children. It is mailed to parents of children aged 1 month to 3 years in New Mexico on a monthly basis. The newsletter is free and a subscription form is included with each birth certificate. Newsletters were also mailed to Gila Regional Medical Center, Nevada Cooperative Extension, Florida Even Start, Babies R Us, Albuquerque Early Head Start and the Michigan Even Start Program. In combination with the Agricultural Communication Department, 24 issues of Baby's First Wish were revised for print copies and web posting at www.nmcyfar.org. A national web site on all states newsletters, with a link to New Mexico's newsletters, was designed for Extension Specialists in conjunction with the USDA-CSREES Age Paced Newsletter Committee at www.parentinginfo.org

b. Impact/ accomplishment

Between 8,274 (June, 2002) to 10,082 (September, 2002) families receive the newsletter every month. The program celebrates its 10th year in existence in 2003. Families from every county are represented on the mailing list. Ethnic demographics of the parent recipients are: Hispanic 55 %; Anglo 41.5%; Native American 2%; African American 1%; Asian .5 %. 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 3b & c

d. Scope of impact - Multistate (NV, FL, MI)

Key Theme - Tourism

Rural Economic Development Through Tourism (REDTT)

a. Description of activities

Nine out every ten American travelers wants to get off major highways and travel the by-ways and back roads of rural America. Tourism is one of the most successful industries in the state of New Mexico, generating over $3.7 billion in revenues each year and creating more than 75,000 jobs statewide. REDTT (www.nmquest.org) provides education, training and technical assistance to 13 New Mexico counties to enhance area tourism industries. It works through county tourism councils set up in each county 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

Although specific dollar amounts are difficult to judge, REDTT has had economic impact on the counties it serves through festival evaluations, which help improve local festivals and, through the festival evaluation document, help festival committees obtain increased funding. REDTT has awarded nearly $200,000 in grant funds to member counties since the project began in 1992. The money has been used as matching funds for grants from other funding agencies and also has been used as seed money for a wide range of tourism projects, including educational billboards, brochures, banners and maps, festival development, familiarization and writers' tours, and trade show development. REDTT also has awarded more than $150,000 since1992 in funds to county CES offices to help pay for tourism-related expenses. And, REDTT had paid more than $100,000 for part-time Extension program aides to work in counties served on tourism initiatives.

The following economic impacts are a result of REDTT programming:

- 5,500 tourism employees, managers, and volunteers were trained through the *Catch Our Enchanted Spirit!* program (cost/benefit ratio of $7.00 earned for each $1.00 spent).
- Over 1,000 trips were taken and 320,000 miles were traveled by REDTT staff to attend county tourism councils, conduct tours, and assist with surveys (cost/benefit $3 to $1).
- Fifty-five familiarization tours were conducted by REDTT or with direct REDTT involvement (cost/benefit $5 to $1).
- Five travel writers' tours were conducted including the Billy the Kid Country Writers' Tour which has generated more than $50,000 to date, and the Sierra County Writer's Tour which has generated more than $20,000 to date (cost/benefit $9 to $1).
- Twelve festivals were started by REDTT or with direct REDTT participation, including Roswell's Chile and Cheese festival, Lincoln County's Arts in the Orchard, and Starry Night Party and DeBaca County's Winterfest (cost/benefit $6 to $1).
- More than 50 conferences and workshops produced including tourism task force meetings, rural tourism conferences, festival development workshops, and grant workshops.

- The New Mexico Department of Tourism reports that tourism related sales dollars have increased in REDTT counties 5% more than in all other New Mexico counties.
- More than $36,000 in grant funds have been awarded to member counties for tourism initiatives within the past year, and more than $230,000 awarded since its inception.
- Over $110,000 in media coverage has been generated by REDTT activities.

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

d. Scope of Impact - State Specific

Key Theme - Youth Development/4-H

Youth at Risk

a. Description of activities

With the investment of Juvenile Justice monies, New Mexico's youth at risk program has provided at risk programming in counties in the form of after school, summer or in school 4-H Share/Care programs. Program goals are designed to provide substance abuse prevention education strategies and emphasize self-development for youth ages 5-19 years. Since the programs inception 4,538 youth have benefited from participation and the number of counties and Extension agent involvement has increased from four counties to six counties.

b. Impacts/accomplishments

Over the past year, 1,236 children received from 10-30 hours of substance abuse prevention education. An additional 393 youth received 5-9 hours of substance abuse prevention education.

The following social impacts were made as a result of programming:

- Twenty-five percent of participant youth will be able to demonstrate a 10% knowledge gain on a substance abuse pre-post knowledge gain survey.
- Twenty-five percent of participant youth will be able to give three or more reasons to not take drugs.
- Twenty-five percent of participant youth will be able to state at least one effect abusive substances have on body functions.
- In all participants there was an overall 11% increase in life skill development factors (increased protective factors and reduced risk factors).
- In terms of locus of control, members indicated a 71% increase in their answer to the question, "I have control over what I do."
- In terms of knowledge gained, members indicated a 9% increase in knowledge gain on the statement "I know what makes me mad."
- In terms of knowledge gained, members indicated a 46% increase in knowledge gain on the statement "I can leave a bad situation."

- In terms of knowledge gained, members indicated a 22% increase in knowledge gain on the statement "I know why alcohol is bad for me."
- In terms of decision-making, students indicated a 47% increase in response to the statement, "I can solve most problems that come up."
- In terms of decision-making, students indicated a 27% increase in response to the statement, "I take the time to think before making a decision."
- In terms of problem solving, students indicated a 21% increase in response to the statement, "I can think of two or three ways to solve a problem."
- In terms of making healthy decisions, members indicated a 23% increase to the statement, "I have a goal to not use drugs."
- In terms of peer pressure, students indicated a 22% increase to the statement, "I know different ways to say no to my friends when they try to get me to do something I do not want."

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

d. Scope of Impact – statewide/national

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.

This past year, the Extension Support Council compiled a broad set of initiatives covering a variety of program efforts from working with local governments to computer learning centers in every county, to marketing Extension (a total of 60 initiatives). Most of the efforts have been "added in" to existing program efforts as additions or perceived program "holes". The initiatives came from county advisory groups through Support Council representation. The Extension Service has taken these initiatives seriously and will report on these accomplishments as they impact programs next year.

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 multistate, 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. For example, the Tri-State Navajo Project addressed sustainable agriculture issues facing the Navajo Nation in New Mexico, Arizona, and Colorado. For some programs, it is still too soon to determine whether expected outcomes and impacts will be achieved. 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.

E. Multistate Extension Activities

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

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

Check one: **X** **Multistate 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 2003FY 2004**
Profitable Livestock Production		18,000	26,317	
Invasive Noxious Weeds		19,260	11,783	
Development of Culturally Sensitive Materials		20,000	8,659	
Life Skills Through Knowledge		13,210	11,421	
Range Management Education		6,500	26,064	
Pecan Nut Management		6,500	12,541	
Dairy		12,150	12,177	
Volunteer Development		7,610	7,614	
Water Education		18,625	0	
Wildlife Management		7,500	12,948	
Plant Pathology		0	11,832	
Total		129,355		

Director Date

Form CSREES-REPT (2/00)

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

Check one: **X** **Multistate 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 2003FY 2004**
Urban Horticulture		0	11,110	
Food Safety		0	10,287	
Integrated Pest Management		0	2,110	
Infant Nutrition and Welfare		0	11,490	
Total		129,355	176,353	

Director Date

Form CSREES-REPT (2/00)

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.

Pecan Nut Management

Commercial nut production is a large industry in many of the southern and southwestern states including New Mexico. Growers need to keep abreast of new, or improved techniques in order to manage their orchards and make a profit. Coordinating and maximizing use of orchard inputs helps growers to be selective in their orchard practices, choosing those that can help them to obtain optimum yields with less cost.

The major educational forum is the annual western pecan conference held in New Mexico for growers from Texas, Arizona, California, and New Mexico. Around 700 people participate in conference events. Other educational sessions throughout the year include field days, short courses, workshops and distribution of timely publications including a monthly column for a California magazine. Even though Texas and New Mexico share frequently on nut management efforts scheduled activities benefit everyone growing pecans/nuts in the southwestern region (West Texas, Arizona, California, and New Mexico).

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. Multistate collaboration was established between the NMSU Dairy Program and Arizona, Oklahoma, Texas, and California. These Multistate 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

Extension faculty are creating a significant library of Extension multicultural, multilingual resources for Hispanic and Native American audiences. At least 25 percent of Extension's state specialists and field staff have assisted with the creation or distributing of more than 50 titles in video and computer CD formats. Several of the indicators of program success include NMSU Extension educators aware of and using these multilingual and culturally sensitive educational materials; materials having been used by more than 30% of Extension state specialists or field staff; over 50 multilingual educational tools having been created to date; multilingual educational tools having been recently promoted nationally, at the National Food Safety Conference, National Conference for Extension Home Economists, the National Healthy Eating Conference and USDA's Fight BAC! Program Conference; and one of the clearest messages our clientele have reported is 'they feel they learn more and feel a warmer reception from Extension when they are taught using culturally sensitive materials in their native language'. Many of the grants secured for development of these curriculum materials have had partners from throughout the nation's Extension services including Hawaii, Arizona and West Virginia.

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, multistate 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.

Wildlife Management

Extension Wildlife and Range Management specialists help mediate Section 8 consultation between permittees, U.S. Fish and Wildlife Service, U.S. Bureau of Land Management, and the U.S. Bureau of Reclamation regarding a livestock grazing permit along the Rio Grande River. The permittees had been subjected to several permit reductions based on potential habitat restrictions for the southwestern willow flycatcher (SWWF). The Extension Range Improvement Task Force was asked to provide scientific information regarding the effects of livestock grazing on SWWF habitat and the birds directly. Since the inception of this effort, approximately 15 meetings have been held to address and resolve the conflict between permittees and federal agencies.

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.

Food Safety

The major objectives of this program are promotion of regulatory compliance, product process development, food safety and sanitation, and marketing of specialty food products. Additionally, a collaborative USDA grant with Cornell University allows for programming towards specialty crop producers through the year 2004. Programming also focused on the special population of Navajo meat processors in cooperation with the USDA and NM meat and livestock board.

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.

Infant Nutrition Welfare

Baby's First Wish is an age-paced, developmental newsletter for parents of young children. It is mailed to parents of children aged 1 month to 3 years in New Mexico on a monthly basis. The newsletter is free and a subscription form is included with each birth certificate. Newsletters were also mailed to Gila Regional Medical Center, Nevada Cooperative Extension, Florida Even Start, Babies R Us, Albuquerque Early Head Start and the Michigan Even Start Program. In combination with the Agricultural Communication Department, 24 issues of Baby's First Wish were revised for print copies and web posting at www.nmcyfar.org. A national web site on all states newsletters, with a link to New Mexico's newsletters, was designed for Extension Specialists in conjunction with the USDA-CSREES Age Paced Newsletter Committee at www.parentinginfo.org.

F. Integrated Research and Extension Activities

U.S. Department of Agriculture
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Multistate Extension Activities and Integrated Activities
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Institution **New Mexico State University**
State **New Mexico**

Check one: ____ **Multistate 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		
Nutrient Management	3,454	3,696	0		
Pest Management of Cotton	3,454	3,696	0		
Pecan Nut Development	1,796	1,922	3,135		
Forage Fiber Tradeoff -- Piñon-Juniper Woodlands	6,908	7,392	18,624		
Integrated Weed Management for NM Rangeland	6,217	6,652	8,095		
Costs & Returns for Crops & Livestock	4,836	5,175	22,215		
Risk Management in Ag. & Natural Resources	6,217	6,652	2,709		
Vegetable Production	1,589	1,700	2,694		
Turfgrass, Soil, Water	1,658	1,774	1,856		
Dairy Production	1,243	1,330	1,705		
Total	44,764	47,898			

Director Date

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

Check one: ____ **Multistate 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 2003FY 2004**
Riparian Management	2,556	2,735	3,235	
Systematic & Floristic Studies of SW Plants	6,217	6,652	7,473	
Cattle IPM	7,599	8,131	0	
Biological Control of Rangeland Weeds	6,908	7,392	6,752	
Food Safety	1,036	1,109	1,372	
Integrated Media Projects	0	0	7,608	
Water Quality	0	0	3,845	
Brush & Weed Management	0	0	1,571	
Peanut Research	0	0	7,359	
Total	69,080	73,917	102,792	

_____ _____
Director Date

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

Check one: ____ **Multistate 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 2003FY 2004**
Range Improvement Task Force	20,450	24,724	6,854	
Systematic & Floristic Studies of SW Plants	2,727	3,000	1,319	
Peanut Research	10,452	18,000	12,766	
Riparian Management	9,089	20,000	9,705	
Vegetable Production	11,361	15,000	13,469	
Soil, Water Pesticide Issues	5,908	10,000	3,113	
Integrated Media Projects	58,623	50,000	15,447	
Economics Risk Management	5,226	7,500	1,982	
Brush and Weed Management	12,951	15,000	6,284	
Integrated Pest Mangement	9,089	15,000	7,028	
Food Safety	9,089	0	5,486	
Total	154,965	178,224		

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
Multistate Extension Activities and Integrated Activities
(Attach Brief Summaries)

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

Check one: ____ **Multistate 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 2003FY 2004**
Water Quality	6,817	8,000	10,005	
Pecans Nut Development	12,724	14,000	15,677	
Turfgrass, Soil, Water	11,361	15,000	13,921	
Costs & Returns for Crops & Livestock	8,180	10,000	3,940	
Excess Property	6,817	7,500	18,414	
Dairy	11,361	13,000	6,413	
Soil, Water, and Ag. Productivity	3,636	25,000	24,137	
Agricultural Economics (discontinued)	8,407	0	0	
Food Safety and Nutrition (discontinued)	2,954	0	0	
			175,960	
Total	227,222	270,724		

Director Date

Form CSREES-REPT (2/00)

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 Scientist established testing facilities at NMSU to examine food products for factors affecting their safety and stability. Included in the testing procedures are microbiological analyses including the standard plate count, yeast and mold counts, coliform determinations and

E. coli determinations. Water activity and pH are two other characteristics of foods that are tested at the Extension Food Technology Laboratory. The results of the testing provides information that can establish whether certain food items are being processed safely or not.

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, 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 has 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.

Pecan/Nut Development

Commercial nut production involves pecans and pistachios. Growers need to keep abreast of new or improved techniques to manage their orchards better. Coordinating and maximizing use of orchard inputs helps growers to be more selective in their orchard practices, choosing those that could help them to obtain optimum yields with less cost.

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.

Agricultural Economics

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. Management of time and other resources are also topics of educational programs.

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: Southwest Yard & Garden, a weekly statewide PBS program hosted by Extension faculty and often featuring AES scientists and their research; a chile video depicted mechanical harvesting research and Extension efforts to disseminate new information; and a pesticide how-to video, which is an Extension outreach piece based in AES research. All people in New Mexico need educational programs on good nutrition and healthy living. English-only tapes will not fill the needs of our multicultural population. Therefore, over 30 multilingual video and computer-based educational programs have been prepared over the past several years to be used by the Agricultural Experiment Station, Cooperative Extension Service, and cooperating agencies. Most of these materials are available in both English and Spanish with many also available in Navajo. A few programs are available only in Spanish or in a mixed Spanish/English presentation.

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. This 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.

Food Safety and Nutrition

The value of agricultural food products can be significantly increased through food processing. Value-added food processing may generate a significant number of jobs in the state of New Mexico. Small farmers are raising more and more specialty crops, which lend themselves to unique food products. Many of these crops are taken out of the state as raw material for processed products. These same products return to New Mexico's food markets as processed foods with high value. The added value of those products could significantly benefit the economy of New Mexico if they were processed in the state. If this is to occur, producers and processors need reliable information on basic food processing and product development. Safe food processing methods are essential for processors to be successful. This same safe food handling information is important to New Mexico's restaurant and tourism sector. Occasional outbreaks of food born illness give credence to the importance of directing food safety programs toward the food industry at all levels.

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.

Excess Property

Excess federal property is identified and procured on behalf of both research and extension programs at New Mexico State University.