NORTH CAROLINA

COOPERATIVE EXTENSION

AREERA

Annual Report of Accomplishments and Results

Agricultural Research, Extension and Education Reform Act of 1998

2004

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North Carolina Cooperative Extension
North Carolina State University and North Carolina A & T State University

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Report: 2004 AREERA Report for North Carolina Cooperative Extension

This report represents the combined Extension programs of both North Carolina State University and North Carolina A & T State University as represented in the AREERA plan of work submitted in 1999 and revised in 2000 and slight revisions each year afterward.

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INTRODUCTION

To achieve their shared land-grant missions, the College of Agriculture and Life Sciences at NC State University and the School of Agriculture and Environmental Sciences at North Carolina A&T State University work collaboratively to provide educational opportunities that are relevant and responsive to the needs of individuals, communities, counties and the state. At the heart of their partnership is North Carolina Cooperative Extension.

Cooperative Extension's mission is to help people put research-based knowledge to work for economic prosperity, environmental stewardship and an improved quality of life. To address ever-changing needs, the organization operates under a dynamic long-range plan of work -- one that changes as circumstances indicate it should. The plan encompasses five major areas of concern statewide:

- Enhancing agricultural, forest and food systems
- Developing responsible youth
- Strengthening and sustaining families
- Conserving and improving the environment and natural resources
- Building quality communities

To achieve the plan's 50 major objectives, specialists at the state's two land-grant universities work hand-in-hand with field faculty serving in all 100 counties and on the Cherokee Reservation. Specific objectives within the five major program areas that specifically target limited resource audiences, while every objective has limited-and non-limited-resource audience parameters. Extension at NC A&T is guided largely by these targeted objectives.

The Extension professionals' work is coordinated with the efforts of the North Carolina Agricultural Research Service (NCARS), the research arm of the College of Agriculture and Life Sciences (CALS) at NC State University. In fact, about 100 of the 350 Extension faculty within CALS have joint appointments with NCARS.

In addition to this alliance with research faculty, Extension benefits from the input of a well-established statewide system of lay advisers representing the state's diverse population. Also, each county routinely conducts an environmental scan to determine emerging needs and appropriate education responses. These scans give residents, advisers, commodity group representatives, volunteers and other clients the opportunity to ensure that local programs meet local needs and priorities.

In addition, to ensure that underserved and underrepresented audiences are among those included in program development and implementation, Cooperative Extension has established a new civil rights plan that includes computer monitoring of program participation by gender and race, including goals and plans for assuring that all persons have equal access to any Extension organized groups. A permanent Diversity Task Force monitors programs, suggests policy, develops, and conducts training for the organization.

Stakeholder input undergirds all of Extension's efforts, as it did and continues to do in planning and implementing the five-year AREERA Plan of Work. This report reflects impacts of the joint educational programming efforts of the North Carolina Cooperative Extension Service of NC State University and the Cooperative Extension Program of NC A & T State University. These programs help North Carolina's population of more than 8 million citizens address critical challenges facing them today and in the future.

Funding for Extension programs was provided by Smith-Lever appropriations, state and county funds, plus public and private grants. As a proportion of overall spending, grants and contracts have become increasingly important. These funds have helped Cooperative Extension address emerging challenges in innovative ways, but declining or flat levels of appropriated support from federal, state and county governments pose significant challenges for meeting program objectives.

Additional North Carolina Cooperative Extension program accomplishments and success stories can be found at http://www.ces.ncsu.edu/AboutCES/, and http://www.ag.ncat.edu/extension/.

A. FY 2004 Annual Report of Accomplishments and Results

Goal 1. AN AGRICULTURAL SYSTEM THAT IS HIGHLY COMPETITIVE IN THE GLOBAL ECONOMY

Overview

Goal 1 encompasses extension programs that seek to create and support an agricultural system that is highly competitive in the global economy. Change is the one constant in US agriculture and 2004 was no exception. Tobacco farmers faced great uncertainty during the prolonged debate prior to the enactment of federal legislation to terminate the quota program. Since passage, growers must develop farm plans in a completely new economic environment. The tobacco marketing system continued to change because all of the major buyers have opted for marketing contracts instead of the traditional auction system. The beef sector was rocked by a case of BSE in a dairy cow in Washington (state) at the very end of 2003 that disrupted trade and impacted producer prices. Educational programs responded to producer and consumer concerns. Peanut farmers also continue to adjust and adapt to the termination of the federal quota program and the implementation of a new government income support program. Once again, hurricanes caused problems for some parts of North Carolina with the worst impacts occurring in western part of the state.

Extension programs sought to assist livestock producers through cost cutting changes in production practices and the adoption of new marketing and risk management strategies for beef and other traditional commodities. Programs to encourage the effective use of byproduct feedstuffs helps cattle producers to reduce feed costs, saves manufacturers disposal costs and conserves landfill space. Additional livestock marketing efforts included group marketing in truckload lots and developing alliances with feedlots to enhance prices and cut marketing costs. New and value added livestock enterprises increased in importance as NC producers sought to exploit the markets that the states population centers provide. These included goat meat and meat products sold wholesale to specialty markets and direct to customers,

direct marketed locally produced beef, and homestead cheese production. A grant-supported goat cooperative provided production and management training along with marketing assistance.

The livestock sector of North Carolina agriculture continues to work to develop strategies and response plans to cope with the new foreign animal diseases and bio-terrorism threats, most recently through progress on premises identification. This sector also continues to be faced with significant environmental regulations, training, licensing and reporting requirements. Other issues potentially affecting agricultural competitiveness and profitability include new federal air quality initiatives related to confinement livestock feeding operations (CAFOs), modifications to environmental regulations to include phosphorus and the development and adoption of new state environmental rules in specific watersheds.

Aquaculture is one of the most rapidly expanding food production sectors but limited water supplies and environmental concerns limit growth under traditional fish farming methods. North Carolina State University has earned a worldwide reputation as a leader in aquaculture technology development and the commercialization of new species of food fish. Faculty have been active in the development and dissemination of this technology through scientific channels and to thousands of interested citizens in North Carolina, the United States, Australia and Europe. Work on feed management for hybrid striped bass producers has lead to improved feeding efficiency and reduced nutrient loading, providing economic and environmental benefits. Additional programs focused on creating value added products including smoked trout pate and 12 trout stuffings. The seafood safety and quality education and training program provided individuals and regulatory officials with technical and informational assistance, including new rules and record keeping requirements under the Bioterrorism Preparedness Act of 2002 and HACCP training. Work on biocidal products has lead to improved methods for the control of spoilage bacteria for increased food safety and shelf life. NCSU, the University of Idaho, and the University of Arkansas cooperated in gathering information on production practices and costs and the cost/benefits of implementing new effluent treatment methods. This information was provided to EPA for use in determining appropriate guidelines and possible new regulations for the trout industry, helping to assure these would be based on sound science while protecting the economic viability of producers.

The prolonged debate and uncertainty that preceded the ending of tobacco quotas and low and variable profits for many traditional enterprises created additional interest in alternative farm enterprises. Specialty crops are important segment of North Carolina's agriculture. Nursery, greenhouse and vegetable crops contribute over $1.25 billion to farm gate value and this share is growing. Program activities include regional and county workshops on alternative income sources, including commercialization of native species and the production of various ornamental crops, organic production methods, and agro-tourism. Crops included a variety of soft fruits and vegetables. These activities draw audiences of all types and levels of experience, including new producers and existing producers, and large scale, limited resource and part-time producers. Topics addressed include cultural practices and alternative marketing channels and strategies. Marketing initiatives included creating grower associations, promoting the use of local farmers markets, starting pick or cut your own operations, and combining agro-tourism and direct marketing. North Carolina cooperated with a region-wide initiative to improve the consumer safety of fresh produce by training growers, farm workers and packers.

Field faculty and state specialists of North Carolina Cooperative Extension at NCSU and NC A&T SU responded to these and other issues with a broad array of extension programs. Livestock generate 60% of North Carolina's gross farm income. Fears of foreign animal disease outbreaks and bio-terrorism continue to provide added impetus to expand the scope of emergency animal response programs initiated

in response to recent hurricanes, including a coordinated state and county system of animal response teams (CARTs) in all counties. The North Carolina approach to disaster response is being used as a model by other states. Other, more traditional programs targeting hog, poultry, beef, dairy, goat, horse, and aquaculture producers continued but at reduced levels because of program redirections along with reductions in staffing levels due to continued state and county budget constraints.

Extension programming under Goal 1 matched the rich diversity of North Carolina's agriculture and reached the full range of audience types, from large commercial producers to part-time and limited resource farm families. The vast array of educational programs were evaluated and reported by field and campus specialists, with primary evaluation tools used such as observation, interviews, data analysis, participant surveys and questionnaires, as well as participant pre and post tests.

FTEs & Program Cost for Goal 1

Program cost is inclusive of federal Smith-Lever funds, state funds, Smith-Lever 1890 funds and some contracts and grant funds.

State FTEs - 44.75	County - 66.5	Program cost- $6,960,986

NCCES FTEs -State 42	County - 62	Program cost- $6,589,986
NC A & T FTEs - State 2.75	County - 4.5	Program cost- $371,000

KEY THEME: Aquaculture

a. Producers and marketers of aquatic species will select, adopt and successfully implement practices or enterprises that will achieve individual and family goals related to profitability and quality of life.

b. Impacts: program accomplishments include increased awareness and knowledge of best management production practices by 140 producers and 31 producers adopted best management practices that optimized income. The total impact of these activities was estimated to be $14,139,267.

c. State Specific

KEY THEME: Animal Health

a. Building on the experience of the devastating effects of Hurricane Floyd on the livestock industry of eastern North Carolina (and on domestic companion animals) and homeland security concerns following 9/11, an interagency emergency preparedness program has been developed. This program is dedicated to preparing, planning, responding and recovering during animal emergencies, including natural disasters and disease epidemics. It operates at a grass roots level, with County Animal Response Teams organized under the State Emergency Management program. This effort has been held up as a model program for protecting animal health and welfare and is being studied by many other states. NC Cooperative Extension Service is a cooperator and county faculty and campus specialists were actively involved in developing CARTs. The need for such a program was not anticipated in the planning process for this Goal.

b. Performance measures include numerous meetings at the state and county level were held to develop and refine the State Animal Response Team (SART) and County Animal Response Team (CART) programs for rapid response to state emergencies involving animals. Several disaster response plans involving multiple state agencies (Emergency Management Services, Natural Resources, Health Departments, etc.), businesses, and key citizens were developed for several counties. Several outstanding county programs were used as models for the development of programs in other counties.

c. State Specific

KEY THEME: Agricultural Profitability

a. Producers and marketers of livestock and poultry will select, adopt and successfully implement practices or enterprises that will achieve individual and family goals related to profitability and quality of life.

b. Impacts: program accomplishments include increased awareness and knowledge of best management production practices by 20,301 individuals. This total included 685 dairy producers, 5,220 beef cattle producers, 1,306 hog producers, 7,428 horse producers, 5,002 sheep and goat producers, and 520 poultry producers. 9,250 producers adopted best management practices that optimized income, including 89 dairy producers, 1,760 beef cattle producers, 894 hog producers, 2,744 horse producers, 3,546 sheep and goat producers, 186 poultry producers, and 31 producers of aquatic species.
The total impact of these activities was estimated to be $14,139,267.

c. State Specific

KEY THEME: Agricultural Profitability

a. Row crop farmers will continue to implement recommended production practices and management systems, investigate innovative agricultural opportunities, develop business ands human resource plans, and explore marketing options to ensure continued farm productivity and profits and quality of life. In particular, tobacco and peanut farmers will be assisted in investigating innovative agricultural opportunities and exploring marketing options to ensure continued farm productivity and enterprise profits.

b. Impacts: Crop producers adopted 66,748 approaches to ensure continued farm productivity and profits and quality of life, including 6,354 for cotton producers, 16,434 for grain producers, 3,716 for peanut producers, 14,542 for tobacco producers and 16,016 for soybean producers.

49,289 of the practices and alternatives adopted were in production areas such as pest control, tillage, fertilization, and variety selection. Considered individually, these changes were put into practice on 8,335,837 acres of crops.

Increased profits through the adoption of new marketing and risk management strategies, business planning and labor management involved 17,459 producer contacts and impacted 1,254,780 acres.

The financial impact generated by all of these accomplishments is estimated to be $9,590,837.

c. State Specific

KEY THEME: Agricultural Profitability

a. Commercial horticulture growers will continue to implement recommended production practices and management systems, investigate innovative agricultural opportunities, develop business ands human resource plans, and explore marketing options to ensure continued productivity and profits and quality of life.

b. Impacts: Growers adopted 6,719 individual approaches to ensure continued productivity and profits and quality of life, including 2,427 by fruit growers and 4,292 by vegetable producers. 5,408 of these practices and alternatives adopted were in production areas such as weed and disease control, tillage, soil fertility, and variety selection. Considered individually, these changes were put into practice on 1438,147 acres.

Increased profits through the adoption of new marketing and risk management strategies, business planning, and labor management involved 1311 producer contacts and impacted 41,372 acres.

The financial impact generated by all of these accomplishments is estimated to be $16,851,541.

c. State Specific

KEY THEME: Diversified/Alternative Agriculture

a. Issue: Interest in meat goat production as a new and alternative agriculture business opportunity has increased dramatically during the past six years in North Carolina and the southeastern U. S. because of an increase in ethnic groups who prefer goat meat in their diet. In addition, interest in meat goats has increased because of their ability to control weeds and brush that invade pastures and other non crop land.

b. Impact: Due to better selection and evaluation of forages and fodder trees for meat goats and the use of locally-available byproduct feeds, the efficiency of goat production has improved. In addition, meat goat health has been improved through the use of non-pharmaceutical approaches to treating gastrointestinal parasites. A North Carolina Meat Goat Producers Cooperative has allowed better communication by Extension personnel representing NC A&T and NC State Universities in encouraging meat goat producers to adopt best management practices. Goat sales and the participation by producers in goat shows have increased four to eight fold across the state over the past several years. Producers in NC sold about 230,000 goats for meat in 2004, generating receipts of over $9.7 million dollars. In addition, the NC meat goat industry breeding stock inventory totals about 158,000 animals located on over 3,200 farms, representing a capital of over 15.5 million dollars. It is anticipated that the meat goat inventory will grow by 8-10% in 2004.

c. Scope of Impact: State

KEY THEME: Small Farm Viability

a. a. Issue: Limited resource and other small farmers will use an integrated, systems approach to implement alternative agricultural opportunities and enterprises. Field faculty and state specialists of North Carolina Cooperative Extension at NCSU and NC A&T SU responded to these and other issues with a broad array of extension programs. Interest in alternative enterprises is high and marketing is the critical question before production decisions can be made. Program efforts have been made in developing and disseminating information focusing on business and marketing planning to address issues of scheduling, quality, display and packaging, collaboration in terms of successful marketing, licenses, permits and liability. As interest in local food systems, agri-tourism and support for local farms has interested many communities have responded by starting or reinvigorating their farmers markets. Extension is also working on bringing market awareness of high end market opportunities in organics, specialty meats and flowers. Extension has assisted with this process and with the development of production systems to assist small, part time and limited resource producers to offer quality products over extended marketing periods to local customers.

b. Impacts: program accomplishments have resulted in producers adopted 8,141 alternative production, marketing and business practices. These practices impacted 133,190 acres and generated an additional $8,511,258 for these producers. New Farmers Markets have been opened in Hickory, Wilmington, Danbury and other locations. Producers have learned new skills to supply direct market channels. Technologies of drip irrigation and the use of black plastic have been demonstrated through a Mentor Farmer Program at NCA&TSU. Also, improved marketing practices generated almost $1.4 million in increased income. Presence of producers in multiple markets saw revenues increase by $1.8 million.

c. State Specific

KEY THEME: Farm Management

a. Issue: A survey of small, part-time limited-resource farmers revealed that their records and receipts were kept on the dashboards of trucks, under truck seats, shoeboxes, paper bags, record books, and file boxes. The lack of adopting modern record keeping and filing systems reduce these farmers' abilities to obtain loans, make legal settlements and effectively market their crops. The NC A & T project, Farmers Adopting Computer Training (FACT), was implemented to assist small, part-time and limited-resource farmers in eliminating some of the problems encountered due poor record keeping and farm management practices. The project provided training in basic computer use, spreadsheets and word processing. Use of the internet and email was also introduced. Local community colleges partnered with Extension to assist with the computer training for these farmers.

b. Impacts: Small, part-time, and limited resource farmers applied the skills learned in their computer training to improve record keeping and filing systems, transact business via the Internet, send correspondence via e-mail, and access information from governmental and non-governmental agencies. Approximately fifty percent, of the 150 FACT participants, had never used a computer. They gained new knowledge and developed skills needed to effectively use the computer for record keeping and farm management. Ninety-eight percent of all farmers displayed confidence and ease with using computers.

c. Scope: State specific

Goal 2. A SAFE AND SECURE FOOD AND FIBER SYSTEM

To ensure an adequate food and fiber supply and food safety through science-based detection, surveillance, prevention, and education

Overview

While our food supply is among the safest in the world, each year 76 million Americans are still stricken with foodborne illness, and some — mostly the very young, elderly, and the chronically ill — die as a result. Hospitalization costs for these illnesses are estimated at more than $3 billion a year and costs from lost productivity are much higher. To reduce the health risks and associated costs, people need access to a safe and secure food supply. The issues associated with food safety and security are broad and complex, making it essential to develop educational programs for specific segments of the food chain – food producers, processors, handlers and consumers. The public also expects a fiber supply for paper and wood products that is affordable and processed in a safe and environmentally sustainable manner.

The 2003-2004 Plan of Work for Goal 2 – A Safe and Secure Food and Fiber System includes eight performance goals. These goals address various aspects of the food and fiber continuums that impact the safety and security of the food and fiber supply in North Carolina. Thus, the activities and impacts described in this section are very diverse. The eight performance goals are: (1) Agriculture and the Environment; (2) Animal Production and Marketing Systems; (3) Crop Production and Marketing Systems; (4) Food Products Manufacturing; (5) Forest Products Manufacturing; (6) Food Safety and Quality; (7) Biotechnology; and (8) Residential and Community Water and Waste Management.

FTEs & Program Cost for Goal 2

Program cost is inclusive of federal Smith-Lever funds, state funds, and some contracts and grant funds.

State FTEs - 28	County - 37	Program cost- $4,105,382

PERFORMANCE GOAL 1: AGRICULTURE AND THE ENVIRONMENT

KEY THEME: Pesticide Application **(also addressed under Goal 4)**

a. Issue: The Pesticide Certification and Licensing Program provides a direct link between NCCES and North Carolina's farmers. All commercial pesticide applicators, public operators, consultants, dealers, and private pesticide applicators are targeted in this program to be certified and trained in pesticide Best Management Practices (BMPs) to protect worker health, crop safety, beneficial insect populations, and other environmental protection issues. To become certified, they must pass a multiple choice exam administered by NCDA. To maintain their certification, they must attend a 2-hour "safety" course and obtain 2 additional (elective) hours every 3 years. In virtually all of NC's 100 counties, an Agricultural Extension Agent serves the role as Pesticide Coordinator.

b. Impact: Of the 21,489 private pesticide applicators (farmers who use restricted-use pesticides) in North Carolina, 769 were newly certified in 2004 and 8,594 were recertified by attending CES training programs. Even with newer, safer and more concentrated products, the adoption of nearly 5,639 new pesticide BMPs such as scouting and biological control on 146,463 acres significantly reduced pesticide usage. Moreover, through the effective training and advertising of the pesticide container recycling program, 141,972 pesticide containers were recycled thus preventing them from ending up in community landfills. The estimated reduction in production costs from proper use of pesticides totaled $2.5 million.

Impact: Private pesticide applicators (farmers, foresters, nursery managers, and greenhouse operators) are required by federal and state law to maintain records of all restricted-use pesticide applications. In collaboration with other Specialists at North Carolina Department of Agriculture and Consumer Services, an Extension Specialist developed an 80-page manual that included a description of all pesticide record-keeping requirements, plus 30 field forms to help NC farmers comply with these requirements. The manual was found to be so effective that the chief of the federal Pesticide Records Branch requested that the Specialist adapt the NC manual for publication as the "official" USDA record-keeping manual. The recordkeeping manual now allows farmers to easily comply with this federal regulation.

c. Scope: National and State specific

KEY THEME: Agricultural Waste Management **(also addressed under Goal 4)**

a. Issue: To assure compliance with federal and state environmental regulations, poultry producers must be attentive in how they manage poultry wastes, particularly spent litter and poultry mortality. To meet current and future environmental regulations, producers must develop site-specific nitrogen-based and soon to be released phosphorous-based nutrient management plans that specify the land application of poultry wastes at agronomic rates suitable to the type of soil.

b. Impact: Extension field faculty have assisted 98 existing and new poultry producers in revising or developing nitrogen or phosphorous-based nutrient management plans for their operations. These plans utilize and manage in excess of 58,247 tons of poultry manure that is generated on site. Moreover, field faculty have developed and provided educational programs and training materials to over 360 producers on such topics as calibrating poultry litter spreaders, the economical use of poultry litter as an organic fertilizer, composting and incineration of mortality disposal, and understanding the new federal EPA phosphorous-based litter management regulations and the new state Phosphorous Loss Assessment Tool (PLAT). This computerized tool will prove useful and relevant in that it identifies specific fields to avoid for applying litter so as to extend the active "life" of the fields.

c. Scope: National and State specific

PERFORMANCE GOAL 2: ANIMAL PRODUCTION AND MARKETING SYSTEMS

KEY THEME: Sustainable Agriculture **(also covered under goal 4)**

a. Issue: The impact of devastating natural disasters in North Carolina has resulted in a significant burden on the state's economy including agricultural programs. To minimize the costs of such events requires that the state develop an effective disaster preparedness program including how best to respond to natural disasters that impact animal agriculture.

b. Impact: In response to the threat of future natural disasters, a county animal response team developed an emergency management-training plan that was used in training 231 citizens, poultry contractors and integrators on the proper steps to take in the event of a disaster as well as the requirements needed to serve as a disaster contractor. In the event of a foreign animal disease outbreak, area poultry companies participated in a mock exercise coordinated by cooperative extension, the NC Department of Agriculture, county health departments, and fire and rescue staff to test their preparedness for responding to a potential outbreak.

c. Scope: State specific

KEY THEME: Agricultural Profitability **(also addressed under National Goal 1)**

a. Issue: To guarantee the profitability of companies and farmers engaged in animal production, it is imperative that the animals get off to a good start in life. This can be achieved through proper nutrition as well as maintaining adequate growing conditions.

b. Impact: A team of extension specialists and scientists discovered that chicken and turkey embryos that receive an *in ovo* feeding during incubation perform significantly better during and after hatching. *In ovo* feeding is the act of providing developing turkey or broiler embryos a nutritional supplement containing peptides, amino acids, and carbohydrates a few days prior to hatch by administration into the amnion. Their studies demonstrated that *in ovo* feeding increased hatchability by up to 5 percentage points and increased hatchling body weight and neonatal growth rate by 3 to 10% over non-*in ovo*-fed controls. Moreover, the digestive system development was accelerated by 48 hours after *in ovo* feeding, such that the *in ovo*-fed birds had gut development at hatch that was similar to that of 2 day-old control birds. Such a boost in hatchability and early growth and development is anticipated to have a very significant economic impact on the more than 8-billion bird U.S. broiler industry.

c. Scope: National and State specific

KEY THEME: Agricultural Profitability

a. Issue: Significant savings for both cattle producers and food processors can be achieved by feeding byproduct and waste products to cattle.

b. Impact: In Alamance county, a company was disposing a fruit waste product into a land fill. Working with a large beef cattle operation, Cooperative Extension personnel worked with this producer to properly use the product as a cattle feed supplement. The company saved about $72,000 per year in landfill fees while the farmer saved $6,862 per year in feed costs. In Caswell County, another producer fed a citrus waste product that lowered his feed costs by $8,400 per year while the processing plant saved $60,000 per year in landfill disposal costs. A Catawba county extension agent assisted a beef producer in using a corn chip waste product that resulted in an annual savings in tipping fees for the company of over $4,000. The annual value of feed received by the farmer was over $11,000 while the value of beef produced from this material was over $34,000.

c. Scope: State specific

PERFORMANCE GOAL 3: CROP PRODUCTION AND MARKETING SYSTEMS

KEY THEME: Biotechnology **(also addressed under Performance Goal 7)**

a. Issue: The application of biotechnological advances to crop production has the potential for not only increasing the profitability of farmers but also for solving significant problems that plague crop production such as protection from diseases.

b. Impact: As a result of on-farm tests and demonstrations conducted by Extension agents and specialists across several counties, growers have adopted using svarieties of corn, soybeans, and cotton that have improved genetic and phenotype traits that are a direct result of advances in biotechnology. In Pasquotank County, for example, approximately 45 percent of the corn acreage is now grown with hybrids containing the Bt gene to minimize yield losses caused by the European Corn Borer and Corn Earworm. As a result of introducing these hybrid seeds, total corn production for the county has increased approximately 85,000 bushels valued at $200,000. Furthermore, applications of specific pesticides have been eliminated, thus reducing the environmental burden.

c. Scope: State specific

PERFORMANCE GOAL 4: FOOD PRODUCTS MANUFACTURING

KEY THEME: Food Safety

a. Issue: Food safety from farm to table is the philosophy of the National Food Safety Initiative. If interventions are not designed and delivered at each level of production, contaminants could enter the food supply and cause illness. Specialists at NCSU are involved in developing educational programs as well as providing services that address food safety on the farm as well as in the food processing environment.

b. Impact: Survey results show that instruction about Good Agricultural Practices have been provided by Extension professionals to over 20,000 persons who produce fresh produce in the southeast.
Since December 2003, assistance has been also been directed toward producers and processors of farmed-raised fresh water species to add value to the state fishery resources. To date, four individuals and firms have participated with special emphasis placed on technical and informational assistance to develop value-added fishery products. New value-added products developed include smoked trout pate and 12 stuffing mixtures for trout. Since 2001, the Seafood Laboratory has assisted six North Carolina businesses commercialize 29 of 53 value-added products. Eleven (11) of these debuted on the market in 2004. In 2004, eighteen individuals received their federally-mandated certification in Hazard Analysis and Critical Control Point seafood safety monitoring practices and ten individuals were certified in seafood sanitation control. Twenty-five (25) county health inspectors were trained on issues related to seafood retail and restaurant inspections.

c. Scope: State specific

KEY THEME: HACCP

a. Issue: Poor sanitation programs can cost a large food processors $250,000 to $500,000 per year in water consumption, wastewater treatment, and lower product quality. A three credit, computer-based food sanitation course (FS 495K) was developed for industry professionals and NCSU students. Over the

past three years over 50 industry persons have taken the course, and Tyson Foods has incorporated this course into their management training program.

b. Impact: In 2004, 20 industry persons were trained in food sanitation practices from large meat processing plants. Their estimated cost savings from improved sanitation programs is estimated to be $5 to $10 million. In 2004 PORK 101 was conducted six times to a total of 126 Smithfield Food employees from four states. Participants ranged from new hires to corporate officers (Chief Information Officer). Participant evaluations gave an overall rating to PORK 101 of 4.61 (4=good and 5 = excellent). The success of this program has met with overwhelming success as evidenced by participant evaluations, corporate commitment, and repeat requests.

c. Scope is state and region specific.

PERFORMANCE GOAL 5: FOREST PRODUCTS MANUFACTURING

KEY THEME: Forest Crops

a. Issue: Extension-sponsored educational interventions were designed to increase the efficiency of utilization, minimize waste, and optimize economics of wood products manufacture and utilization.

b. Impact: In 2004, 435 firms adopted new manufacturing technologies and 498 developed new business management plans. Over 2,600 consumers increased their knowledge about the economic importance of the wood products industry in North Carolina.

c. Scope: State specific.

PERFORMANCE GOAL 6: FOOD SAFETY AND QUALITY

KEY THEME: Food Safety

a. Issue: Americans are eating more of their meals away from home — an estimated 54 billion meals per year. This food is purchased not only from grocery stores and restaurants, but is also eaten in institutional settings such as schools, hospitals, nursing homes, and day care centers. The typical person eats an average of 218 meals away from home each and spends nearly half (46.1%) of their food dollars ($855) eating out. The result of this shift in food consumption away from the home is that the chance for disease-producing errors increases. The challenges faced by this industry include high rates of turnover and language and literacy barriers. As a result many foodservice operators, do not have the resources to provide in-depth training in the area of food safety. Without proper training, foodservice workers could commit errors that could result in foodborne illness. The most recent summary of foodborne illnesses in the U.S. show that nearly 50% of all reported illnesses are due to improper handling in the foodservice environment. Therefore, foodservice workers need to be properly trained on the how's and why's of safe food handling.

Foodborne illness is nearly 100% preventable if the food handler knows and applies safe food handling practices. Education is a cost-effective option for prevention of foodborne illness. Many areas of the U.S. rely solely on a regulatory approach for the prevention of foodborne illness in the foodservice environment. As a result, foodborne illnesses might not be prevented from occurring. Educating workers is essential. Chain operations have the advantage of access to corporate staff that can provide training

free-of-charge. Small independent restaurants and some institutional operations have fewer resources available to them for training. County Extension Centers have been meeting the needs of both small and large operations since 1996 by providing low cost, high quality training that is accessible and that can be tailored to meet their specific needs. The goal of food safety training for the foodservice industry is to improve the safe food handling practices of workers in foodservice operations. Upon completion of a training program, participants will increase their knowledge about how to handle food safely within the foodservice environment and improve their safe food handling practices.

b. Impact: In 2004, 1,535 foodservice managers representing 998 foodservice establishments attended food safety certification training. Eighty-nine percent (89%) passed the certification examination. In addition, over 900 foodservice workers attended food safety trainings and 78% scored 75% or higher on a knowledge test. Additionally, 734 workers representing 215 congregate nutrition sites attended food safety training.

c. Scope is state specific.

KEY THEME: Food Safety

a. Issue: A means for improving the safety of poultry products is using nutritional strategies to reduce *Salmonella* colonization in broilers and turkeys. The risk of foodborne diseases from consuming poultry can be greatly reduced if the colonization of poultry with *Salmonella* can be eliminated by the time the birds go to the processing plant.

b. Impact: A research and extension education program was designed to use nutritional strategies that discourage enteric colonization of *Salmonella* even if the birds are raised in a *Salmonella* contaminated environments. One strategy involved the addition of mannanoligosaccharides from yeast cell walls in poultry diets. These compounds bind to *Salmonella* thus preventing gut colonization in chickens and turkeys. Mannanoligosaccharide was found to turn salmonella-positive chicks into *Salmonella*-free broilers by the time they went to market at 6 weeks of age. Another strategy was to feed poultry diets containing non-starch polysaccharides (NSP) from small grains along with NSP-specific enzymes. Turkeys fed wheat- or triticale-based diets supplemented with NSP enzymes turned *Salmonella*-negative by 16 weeks of age (well before market age), whereas a significant number of birds consuming a typical corn-based diet remained *Salmonella*-positive through to market age. These studies clearly demonstrate that *Salmonella* colonization can be discouraged without the use of antibiotics, and could be a cost-effective way to reduce the risk of contracting a foodborne disease from consuming poultry products.

c. Scope: State specific.

KEY THEME: Food Safety

a. Issue: Biosecurity, food safety and homeland security have become prominent issues in the livestock industries. North Carolina Extension has taken a proactive stance in responding to the need for information on these issues.

b. Impact: Extension and a local Emergency Services Department collaborated on an exercise to help one county become more aware of agriterrorism. This team planned and directed a comprehensive exercise to allow all county departments, NC Department of Agriculture, surrounding counties, hospitals, and agribusiness to develop and critique response plans for an agriterrorism incident. Related to food safety, an educational forum sponsored by several extension agents was also held to educate approximately 100 producers, consumers, and local news media, representing multiple counties in both NC and VA, about the BSE disease in cattle and its potential human health consequences.

c. Scope: State and Regional

KEY THEME: Food Resource Management

a. Issue: Food Safety Education and Training: Fresh Produce Food Safety. The issues associated with food safety are becoming increasingly complex and involve all segments of the food chain (production to consumption). One segment that has become the focus of increasing scrutiny is the production of fresh produce. Fresh produce has been touted for its dietary benefits and thus has become a major component of the U.S. diet. However, fresh produce is often eaten raw, thus microbial contamination introduced at any point from production to consumption is a concern. In an effort to minimize microbial contamination, production practices have become an area of intense investigation. Producers have been asked to voluntarily implement a variety of tactics and techniques that fall under the banner of Good Agricultural Practices (GAPs). NCSU Extension specialists developed a training program and associated training materials for extension agents in the Southeast.

b. Impact: This collaborative program has raised the awareness of Extension agents as well as the producers of fresh produce regarding the significance of on-farm production practices and food safety. This collaboration has resulted in more than 20,000 growers in the Southeast U. S. working to minimize the food safety risk of the crops they produce.

c. Scope of Impact – Regional - Southeast

PERFORMANCE GOAL 7: BIOTECHNOLOGY

KEY THEME: Biotechnology **(which is also addressed under Goal 1 and Performance Goal 3 of this Goal.)**

PERFORMANCE GOAL 8: RESIDENTIAL AND COMMUNITY WATER AND WASTE MANAGEMENT

KEY THEME: Water Quality **(also addressed under Goal 4.)**

a. Issue: Elected officials, community well owners, environmental health specialists, and citizens were targeted through Extension sponsored educational programs to help them to understand water regulations so that they could implement strategies to protect and improve drinking water quality.

b. Impact: The following behavior impacts were reported: 38 did not house animals in the well house, mixed and loaded agricultural chemicals a safe distance from the well, rinsed mixing tanks a safe distance from a well, and separated the well by at least 100 feet from septic or animal manure systems. Ninety-six (96) people had their water tested and 20 reported shock-chlorinated their wells.

c. Scope: State specific.

GOAL 3. A HEALTHY, WELL-NOURISHED POPULATION

Overview

The importance of promoting nutrition and wellness throughout life has been clearly established. Two major scientific reviews, the "Surgeon General's Report on Nutrition and Health" and "Diet and Health" by the National Research Council have documented several diet and chronic disease relationships and have recommended some dietary changes for the public. The Public Health Service "Year 2010 Objectives For the Nation" has also noted the major role that nutrition plays in health promotion and disease prevention. Most recently the US Department of Health and Human Services produced “The Surgeon General’s Call To Action to Prevent and Decrease Overweigh and Obesity 2001.” This document and many other scientific reviews chronicle the rising epidemic of overweigh and obesity that is plaguing the US. If this trend is not slowed or reversed, it could eliminate the progress we have made in reducing the burden of weight-related chronic diseases such as heart disease, stroke, diabetes and several forms of cancer.

Behaviors for Optimal Health

Public interest and concern about nutrition and health issues are at an all-time high. While more consumers than ever are aware of the major issues, fewer can put those concepts into everyday practice. At the same time consumers are vulnerable to misinformation that targets their concerns and fears. Scams and misinformation abound and are costing the public billions of dollars. Consumers continue to need help in using the Dietary Guidelines and the Food Guide Pyramid to incorporate balance, moderation and variety in their diets. Research has shown that consumers do not know the food groups nor the number of servings they and their families should have from each food group. They also do not understand serving sizes and confuse a "serving" with a "helping" of foods. Programs that address these needs continue to be imperative if consumers are to adopt behaviors that optimize their health.

Nutrition and Chronic Disease

Dietary factors are associated with five of the ten leading causes of death in N.C. (and in the U.S.), including coronary heart disease, some types of cancer, stroke, noninsulin-dependent diabetes mellitus, and atherosclerosis. Another three (cirrhosis of the liver, unintentional injuries, and suicides) are associated with excessive alcohol intake. Currently, health professionals are more concerned with excess and imbalance of certain components in the diet than the dietary deficiencies seen in former days. North Carolina has higher age-adjusted mortality rates in comparison to national averages, much of which may be related to what citizens eat. Diets in North Carolina are improving, but 1993 and 1994 statewide surveys show that people still consume too much fat, salt and sugar and too little high fiber fruits, vegetables and whole grain foods. Many people have heard and accepted the message that they should reduce the fat, salt and sugar in their diets; however, all too often, they don't recognize where these

components are in foods or how to lower their intake. As research continues in these areas and as consumers continue to seek the answers to their questions, programs will continue to be needed that address the risk factors associated with various health problems and appropriate lifestyle changes.

Overweight and obesity have reached epidemic proportions and have become on of the most pressing health issues for our nation and state. These conditions are increasing in all age groups of all races and ethnicities. Sixty-one percent of adults in the US are overweigh or obese. There are almost twice as many overweight children and three times as many overweigh teens today as there were two decades ago. Action by a broad array of individuals and public and private partners is essential to reverse this trend.

Lifecycle Concerns

One of the best indicators of maternal and child health is the infant mortality rate, or the number of babies per 1000 live births that die before their first birthday. North Carolina has historically had an infant mortality rate well above the national average but over the past few years has improved to 9.9. This rate, however is still high and reflects the need for continued programming in the maternal and child area.

No time is more important than childhood to promote healthy eating and health practices. Children in North Carolina do not consume enough fruits or vegetables and have diets that are low in fiber and higher in fat than recommended. Children in North Carolina need quality nutrition education to help positively influence their food choices. For nutrition education efforts to be effective they must also include parents and care givers. Helping families make informed decisions about their nutrition will help ensure that North Carolina’s children grow to reach their full mental and physical potential. Overweight in children in North Carolina continues to rise. Preventing overweight and obesity in children is essential to address this issue.

Demographic changes in North Carolina's population continue to impact nutrition and health issues. The fastest growing age group in the state is the 65 years-and-over segment. The elderly run disproportionate risks of malnutrition and poverty as well as poor overall health status. In fact, over 85% of older adults suffer from chronic diseases and could benefit from dietary intervention. The general nutrition needs of the well elderly must be addressed; however, the needs of the elderly for prevention of malnutrition and chronic disease actually begin much earlier in life. Programs addressed to young adults and the middle-aged consumers will continue to impact the health of the population as it "ages."

Women are employed in greater numbers, and many of them are among the ranks of the working poor. Over 80% of women who had school-aged children were working outside the home; 67% of women with youngest child under six years were in the labor force. For working parents with very limited resources, lack of after-school and summer programs for youth are a major concern.

NCCES Responds

Promoting optimum nutrition and health through diet and lifestyle in all North Carolinians regardless of gender, income, age, or race/ethnicity formed the main focus of Goal 3: A healthy, well-nourished population. Education programs addressing diet, healthy, and chronic disease prevention were offered to North Carolinians of diverse income levels, age groups, genders, and/or cultural backgrounds across the state. Programs offered included Partners in Wellness, Give Your Heart A Healthy Beat, Our Destiny Is Our Decision, Color Me Healthy, NoonLiting, Our For Lunch, Dining with Diabetes, SyberShop, Women

Living Healthy – Women Living Well, and Expanded Food and Nutrition Education Program. Programs were held in many different settings including congregate nutrition sites, senior centers, schools, churches, government buildings, businesses, daycare centers, work sites and outdoors. Various methods were employed including using the Internet, computers, mailed materials, media, one-on-one contact, and public meeting. Audiences reached included children, adults and the elderly, day care workers, hospital employees, housing authorities, Head Start, Red Cross, food banks, and community coalitions. As a result of programming, over 27,000 participants increased knowledge tat will promote a healthier diet, many more were reached using mass media techniques such as newspaper, radio and television. Over 11,000 gained in knowledge concerning reducing risk for chronic disease, close to 7,000 participants adopted behaviors consistent with decreasing the risk of chronic disease. Over 3,800 child care providers gained knowledge about the importance of good nutrition for the children in their care. As a result, over 40,000 children adopted behaviors consistent with the Dietary Guidelines including consumption of more fruits and vegetables and improving physical activity.

FTEs & Program Cost for Goal 3

Program cost is inclusive of federal Smith-Lever funds, state funds, Smith-Lever 1890 funds and some contracts and grant funds.

State FTEs - 7.5	County FTEs- 21.75	Program cost- $1,535,111
NCCES state FTEs – 6.5	County FTEs- 21	Program cost- $1,469,511
NC A & T state FTEs –1.0	County FTEs -.75	Program cost- $65,600

KEY THEME: Human Nutrition

a. Issue: Participants will adopt behaviors to promote a healthier diet. The key teaching components of the objective included Worksite Wellness programs, health fairs, workshops and demonstrations, after-school programs, parent-teacher programs, and face-to-face encounters. Media was used to effectively disseminate a clear message about healthy eating patterns. Programs such as the Physicians' Project, Partners in Wellness and Out For Lunch will help participants adopt healthy dietary behaviors.

b. Impact: Number of participants consuming more fruits and vegetables 7,782
Number of participants making one or more positive dietary change 14,422
Numbers of participants increasing knowledge that will promote a healthier diet 27,685
Numbers of participants increasing skills that will promote a healthier diet 18,995

c. Scope: State specific

KEY THEME: Human Health

a. Issue: Participants at risk for chronic disease/condition will change behavior resulting in reduced risk. The key teaching components of this objective include demonstrations/workshops, health fairs, video and audio tapes, home study kits, supermarket/farmer's market tours, and discussion groups and support groups. The mass media was used to effectively disseminate messages about the relationship between chronic disease and eating patterns. Programs such as Give Your Heart A Healthy Beat and NoonLiting will help participants adopt eating patterns that will decrease their risk of chronic disease.

b. Impact: Numbers of participants who increase knowledge in how to reduce risk for chronic disease 21,868
Number of participants who adopt one or more behaviors consistent with decreasing the risk of chronic disease 14,422
Number of individuals reducing risk factors for chronic diseases (heart diseases, strokes, cancers, adult-onset diabetes, arthritis, atherosclerosis, and osteoporosis) including:

- Numbers who decrease high blood pressure 492
- Numbers who decrease high blood sugar 181
- Numbers who decrease excess weight 896
- Numbers who increase physical activity 959

c. Scope: State specific

KEY THEME: Human Nutrition

a. Issue: Participants in nutrition and wellness programs for care-givers, parents, teachers and/or children will improve knowledge and adopt behaviors to promote a healthy diet. The key teaching points for this objective are training in nutrition for child-care providers, workshops for parents, health fairs for parents and care-givers, one-on-one discussion with parents, trainings for classroom teachers and work in the classroom and child-care setting with children. Mass media is used to effectively disseminate nutrition messages to parents and child-care providers about the importance of helping children to form healthy eating habits early in life. Programs such as Color Me Healthy, Out For Lunch and SyberShop will be used to educate caregivers and children about healthy eating and physical activity.

b. Impact: Child care providers increase knowledge about the importance of good nutrition for children and the importance of teaching children about nutrition. 3,917 Children adopt food behaviors consistent with the Dietary Guidelines and Food Guide Pyramid. 20,060 Child care providers teach children about the importance of a eating smart and moving more 3760 providers reaching an estimated 37,000 children. Over 400 classroom teachers attended SyberShop training and are using the CD in their classroom.

c. Scope: State specific

KEY THEME: Human Nutrition

a. Issue: Limited resource audiences will adopt behaviors that improve the nutritional adequacy of their diet. The key teaching components of this objective include neighborhood groups, preformed groups, one-on-one contacts, volunteers and use of the media. Programs such as the Expanded Food and Nutrition Program, Color Me Healthy, **Project Eat Right: Add to Life *(NC A&T)***, Out For Lunch, and Partners In Wellness all help limited resource audiences adopt behaviors that improve the nutrition adequacy of their diet.

b. Impact: Number who showed improvement in one or more food resource management practice 5,952
Number who showed improvement in one or more food safety practice 6,145
Number who showed improvement in one or more nutrition practice 11,883

c. Scope: State specific

Goal 4. AN AGRICULTURAL SYSTEM WHICH PROTECTS NATURAL RESOURCES AND THE ENVIRONMENT

Overview

Agricultural producers, agribusiness professionals, public officials, agency personnel, special interest groups, and the general public are all concerned about environmental quality in North Carolina. Goal 4 promotes efforts to improve production practices and enhance cooperative and collaborative efforts to protect the environment and preserve natural resources while promoting strong and diverse agricultural systems. These efforts are seeing very positive results.

The performance goals under Goal 4 address animal agriculture, plant agriculture (row crops, horticultural crops, and forestry), and agriculture's interactions with the public and government. Target audiences for these action areas are broad in terms of occupation, age, economic status, and knowledge of agriculture.

Performance goal 1 targets livestock, poultry, and fish producers and provides support as they adopt and promote sustainable, economical, and environmentally sound practices to manage water and waste materials for the purpose of protecting air and water quality. New NPDES (federal) and State general permits have presented opportunities for Extension this goal. With these new permits, producers are required to intensify monitoring of their waste handling systems. Extension has played a vital role in the effort to help producers comply with the new regulation, and thus better insure proper management and operation of waste systems. Lenoir county reports:

> "Because of new and existing regulations on swine operations imposed by DWQ, hog farmers must have their irrigation systems calibrated and the sludge in their lagoons surveyed annually. In the spring of 2004, Extension in Lenoir and Greene Counties helped more than 20 farmers calibrated their irrigation equipment and estimate the amount of sludge in their lagoons. Using the information gained in these reports, farmers can make sure they are land applying the correct amount of nutrients to their crops, eliminating runoff and controlling excess nutrients in the Neuse River Basin. Using the sludge survey, the operator can be sure he has a manageable amount of sludge in his lagoon, and if not, Extension helps by creating a sludge management plan to remedy the situation".

During 2004, 4,100 land application operators were trained and certified or re-certified. Conservation BMPs were implemented on over 350,00 acres of pasture, waste application fields, and feed lots, reducing soil loss by 162,315 tons per year. To enhance the effect of nutrient management on the environment, soil, wastewater and plant tissue analysis was performed on 695,000 acres. The estimated economic value of livestock organic by products utilized (nutrients, organic matter, etc.) was more than $112,000,000. Over 3,200 producers are utilizing approved waste management plans, and 888 farms adopted at least one BMP (walking trail, stream crossing, managed stream bank vegetation, or mortality composting).

Performance goal 2 is addressed to field crop producers, nursery and greenhouse growers, turf and landscape professionals, and forestry professionals. This goal seeks adoption of economically and

environmentally sound practices by these groups to manage water, soil, nutrients, and pesticides for the purpose of protecting water quality and improving management of natural resources.

The Neuse Crop Management Project highlights action taken to meet this performance goal. The Project was undertaken to significantly increase the use of production practices that improve economic and environmental performance in the Neuse River Basin. The successful accomplishment of this goal enabled farmers to adopt agronomically and economically sound practices to protect water quality and effectively deal with public and regulatory concerns. Education and assistance by Extension has reaped benefits beyond original goals as related by a Neuse Project team member:

> "Although the Neuse River agricultural community achieved its mandated 30% nitrogen loss reduction goal in 2003, progress continues to be made in exceeding pollution reduction goals. Data compiled in June 2004 indicate that the agricultural community in the Neuse has now achieved a 41% reduction of nitrogen losses compared to the amount of nitrogen loss that was occurring when the baseline was established in 1996."

Implementation of Phosphorus rules with the objective of improved water quality has taken effect in North Carolina. Extension has taken this opportunity to help growers adopt practices to reduce Phosphorus applications or use BMPs to prevent Phosphorus from reaching waterways. An example of this is reported from Duplin County:

> "Based on Extension recommendations, 3 farmers reduced their phosphorus rates on tobacco from 40 pounds per acre to 0 pounds per acre on 125 acres of tobacco. The total reduction for these farms was 5,000 pounds of phosphorus fertilizer. This change in fertilizer application only saved the farmers $3.75 per acre. However, this practice will prevent buildup of soil phosphorus, negative environmental effects, and will insure the future viability and profitability of these farming operations."

Another important facet of extension activity is the continued training offered to address this performance goal. As an example, during 2004, 19,890 pesticide application professionals were certified or recertified, and over 2,100 professionals obtained certification specifically in the landscape, ornamental and turf sector, the bulk of those obtaining pesticide certification.

Training and education has a direct impact on BMP adoption. BMP adoption totaled over 1,500,000 acres in the field crop sector: 424,400 acres were in no-till; 333,700 acres were in conservation tillage; 121,900 acres were in residue management; 161,500 acres were under nutrient management plans; and 485,000 acres utilized crop rotations. BMP implementation in the vegetable crop, nursery, and turf industries totaled over 125,000 acres. Over 150 farms established one or more water quality BMPs (field borders, filter strips, permanent wildlife cover) during 2004. Over 1,800 growers practiced integrated pest management (IPM). Improved row crop and horticultural crop practices reduced soil loss by over 56,000 tons. Fertilizer use was reduced on over 200,000 acres (compared to previous rates), while pesticide application was reduced by over 98,000 pounds (active ingredient basis). Over 12,000 acres of wildlife habitat was established.

The intent of performance goal 3 is multi-faceted and relates to agriculture's participation in general society. Specifically, it is intended that special interest groups, including producers and agribusiness professionals, public officials, environmentalists, the media, consumers, and youth will increase their understanding of and appreciation for the complex relationships between agriculture and the environment. Below is one example of how Extension reached youth while working with other entities:

> "The City of Greensboro and the Guilford County Cooperative Extension sponsored the third annual poster contest with "Water - A Valuable Resource" - as the theme. Sixty first - fifth graders participated in this contest. The posters were judged and savings bonds of $100 (first place), $75 (second place) and $50 (third place) were given to youth in the first - third grades and youth in the fourth and fifth grades. Money for the savings bonds was provided by the City of Greensboro Water Resources Department. Presentations of the savings bonds, certificates and ribbons were made during National Drinking Water Week at the Guilford County Commissioners monthly meeting. County Commissioners acknowledged these youth as well as being viewed by 100,000 viewers on the cable network where their meetings are aired."

Interagency cooperation plays a key role in achieving this overall goal. Extension continues to work with state and local agencies, federal agencies, municipalities, producer and commodity groups, and environmental groups in educational, training, and facilitating activities. An example of interagency cooperation is illustrated in Davidson County:

> "Extension Agents and support staff along with the Davidson Co. Soil and Water Conservation District, NRCS, FSA, and the NC Forrest Service, worked together to conduct the 2004 Agricultural and Conservation tour. The tour was held July 29, 2004. The attendance set a new record, with 58 participants traveling with us on Davidson County Transportation busses, and 9 others joining us to present information at specific stops along the tour. Among the participants were county commissioners, county department heads, and a candidate for county commissioner. The tour also provided 16 pesticide applicators with 1.0 hours of continuing certification."

In 2004, over 1,100 people participated in education programs in land use planning and natural resource management, while 588 people indicated that their participation in policy making increased. About 300 multi-agency coalitions were established.(and over 300 maintained) in 2004 Over 11,000 people – many of them youth - increased their knowledge of the link between agriculture and the environment, though environmental education programs led by Extension.

FTEs & Program Cost for Goal 4

Program cost is inclusive of federal Smith-Lever funds, state funds, Smith-Lever 1890 funds and some contracts and grant funds.

State FTEs – 31.85	County FTEs – 58.75	Program cost $5,387,889
NCCES FTEs -State 31	County - 58	Program cost- $5,315,889
NC A & T FTEs - State .85	County - .75	Program cost- $72,000

KEY THEME: Animal Waste Management

a. Issue: Extension personnel are working with swine, dairy, beef, and poultry producers to assure that they are aware of all of the new regulations and requirements for water quality and nutrient management associated with animal production. Phase-out of anaerobic lagoons, requirements for alternative waste treatment technologies, waste handling certifications, waste utilization plans, and setback restrictions are

just some of the topics that have seen dramatic changes recently and that are having a major impact on the operation of both large and small facilities.

b. Impact: In 2004, the number of producers utilizing approved waste management plans numbered 3,216 and the number of farms adopting waste management-related BMPs totaled 888. This translates directly into improved water quality, due to proper waste application, and adopted BMPs (both structural and managerial) to prevent nutrient movement to waterways. In addition, the economic value of the organic by-products used, totaled $112,000,000.

c. Scope: State Specific

KEY THEME: Soil Erosion

a. Issue: Soil erosion continues to be a major concern in North Carolina, since it has both on-site impacts (loss of fertility, gullying, disruption of normal tillage operations) and off-site impacts (loss of aquatic habitat, pesticide and nutrient pollution, and sedimentation in sensitive areas). Extension is working with other state and federal agencies to educate farm and non-farm communities about erosion control and stream bank stabilization. These efforts not only help keep the soil in place, but also improve water quality and recreational opportunities downstream.

b. Impact: In 2004, soil erosion was reduced by 56,360 tons due to adoption of soil erosion related BMPs. In addition, an estimated 162,300 tons of soil was saved though BMPs adopted on pastures, feedlots, and waste application fields.

c. Scope: State Specific

KEY THEME: Nutrient Management

a. Issue: Improper application of animal waste, as well as non agronomic application rates of inorganic fertilizers, have led to concerns that agriculture is a major contributor to water quality problems, including *Pfiesteria* and algae blooms, in North Carolina's rivers and estuaries. Urban sources of nutrients (lawns, golf courses, waste treatment plants) are also of major concern. Extension is involved at all levels in educating producers, land owners, and the general public on how to best manage fertility and prevent unwanted washoff or leaching of fertilizer materials.

b. Impact: Commercial fertilizer applications were reduced by a total of 434,745 pounds through establishment of BMPs such a field borders, adoption of reduced tillage systems, and application of nutrient management plans.

c. Scope: State Specific

PERFORMANCE GOAL 3:

KEY THEME: Information Transfer to Public Interest Groups

a. Issue: In North Carolina, the impact of agriculture on the environment, requires that groups with often-times differing objectives, come together for the benefit of the state as a whole. These groups include producers and growers, regulators, environmentalists, consumers, and citizens at large. In one such example, basin-wide planning for purposes of water quality protection is required all of North Carolina's 17 river basins. Extension specialists and agents are playing a key role in basin-wide planning efforts by interfacing both with producers and growers, and with State Agency personnel charged with the development of the plans. Extension-initiated educational programs, for producers and the general public, are a key element in reducing nutrient and pesticide contamination in groundwater and surface water drinking water supplies, in waterways, and in estuaries. Demonstrations, workshops, and public meetings are being used to help producers and others understand the complexities of water quality issues, how good management practices can positively impact water quality, and how environmental quality and agriculture can coexist. Interagency cooperation and collaboration between

b. Impact: A total of 19,124 people, particularly youth, were made aware of the link between agriculture and the environment, while 588 people increased there participation in policy making. In addition, 683 people adopted practices to promote sustainable ecosystems. A total of 193 collaborative projects related to air and water quality protection were implemented in 2004.

c. Scope: State Specific

Goal 5. ENHANCED ECONOMIC OPPORTUNITY AND QUALITY OF LIFE FOR AMERICANS

Empower people and communities, through research based information and education, to address the economic and social challenges facing youth, families, and communities.

Overview:

North Carolina is a very diverse state in every sense of the word: in terms of population, types of industry in the state, and in terms of the numerous agricultural commodities produced. The population of North Carolina is now in excess of 8.3 million people. The ethnical and racial diversity has increased greatly due to the different rates of change among the various population groups. The Hispanic population has grown by nearly 600 percent since 1990. During the same time period the Asian population grew by 150 percent while the African-American and white population grew by 15 and 17 percent respectively. In addition the Native American population has also experienced significant growth. North Carolina has a wide variety of industries contributing to the general economy ranging from the fisheries on the coast, to the Christmas tree industry in the mountains, to the furniture manufacturing in the Piedmont, to the farming/agribusiness industry that spans the state. There are large industrial components as well as a rapidly increasing value added and cottage/small business component.

The diverse population described above face many social and economic challenges. Some of these challenges stem from the fact the world functions in a global economy rather than a local economy, and that international trade policies of the USA and the different countries affect citizens in different ways. Consequently, there is a real need for citizens of North Carolina to understand the interrelationships

between what happens in the economies of other countries and how that might affect our economy. Some of the challenges are due to the war on terrorism in which the US finds itself, some are due to the growth/recovery in the US economy being much slower than anticipated, and some challenges are merely due to the increased cost of living that has forced the "second spouse" to enter the work place. All of this puts more stress on the family unit as well as creating a real need for improved child care, and more child care providers.

Other social and economic challenges that face citizens in North Carolina result from North Carolina being a prime "retirement state" and experiencing an aging population of its own. Some challenges are the result of a society that is three to five generations removed from actual production agriculture, and this has resulted in a society that is less understanding and less appreciative of production agriculture. The continual uncertainty surrounding an anticipated major change in the tobacco industry is the source of a large amount of emotional stress for many farm families. Still other challenges are the result of citizens' growing concern for a quality environment, which has led to increased regulatory legislation. These and other social and economic challenges put North Carolina youth, families, and communities at risk.

The youth, families, and communities of North Carolina are at risk of failing to reach their fullest potential because they face the economic and social challenges characterized above. Improved understanding of the economic and social issues of today, and the necessary leadership skills to face and meet these challenges is at the foundation of the Extension educational program in North Carolina. North Carolina Cooperative Extension has designed and is delivering an inclusive set of educational programs to the diverse audiences outlined above. This will improve the likelihood that they will reach their full potential. Continual evaluation of existing programs will insure that all facets of the citizenry will be reached with our educational programs and that the programs meet the needs of the diverse clientele.

North Carolina Cooperative Extension's state and county unit based professionals made major impacts in the year 2003 in five "key theme" program areas: Child Care, 4-H Youth Development, Resilient Youth, Families and Communities, Aging/Estate Planning/Retirement Planning, Community Development, and Family Resource Management.

FTEs & Program Cost for Goal 5

Program cost is inclusive of federal Smith-Lever funds, state funds, Smith-Lever 1890 funds and some contracts and grant funds.

State FTEs - 21	County – 133.77	Program cost $7,531,837
NCCES FTEs -State 19	County - 130	Program cost- $7,304,417
NC A & T FTEs - State 2	County - 4	Program cost- $237,122

KEY THEME: Child Care

a. Issue: The child care Cooperative Extension Major Program has two goals. These goals are to (1) improve the quality of child care in North Carolina and (2) to increase the availability of child care in North Carolina.

b. Impacts: The needs of the childcare community are diverse. Primary among them is the need to improve the quality of care provided by staff through appropriate training. Agents report having trained at

least 1,300 adult childcare providers in 2004. Thus, the North Carolina Cooperative Extension Service has an important impact on the over 12,616 children reached by these child care providers.

Child care continues to be a much needed yet under-funded, service through out North Carolina. To combat this issue North Carolina Cooperative Extension continues to seek out collaborative partnerships and grant funding to alleviate this need. Agents report developing or sustaining at least 671 collaborative relationships in support of child care. Acting in collaboration with other community groups, Cooperative Extension agents have generated over $690,000 new dollars and $382,460 in sustained funding to support child care at the local level.

Increasing childcare availability is sometimes a lengthy process that begins with technical assistance in the form of training, phone calls and site visits. North Carolina Cooperative Extension agents report that the following numbers of providers have increased their knowledge in key areas of child care quality: Over 500 providers trained by 4-H reported increased knowledge and skills in each of the six elements of after school quality: Administration (491), Human Relations (658), Indoor Environment (675), Outdoor Environment (668), Activities (688), and Health, Safety, Nutrition (621). In sites that were evaluated, over 5000 youth demonstrated greater self-confidence (5750), interpersonal skills (6250), community service (5293), homework completion (5111), and academic performance (3384).

The most direct evidence of the impact of CES agents is in the 30 new programs implemented statewide and in the establishment of 1,060 additional spaces for youth to enjoy quality after school programming.

c. Scope: State specific.

KEY THEME: Leadership and Volunteer Development

a. Issue: The goal of Leadership and Volunteer Development is to build the capacity of individuals, community groups and organizations. The results reported by counties for 2004 indicate that educational experiences provided through the Cooperative Extension are instrumental in achieving this goal. Citizens from varying socio-economic levels gained knowledge and skills that facilitated their participation in community problem solving and in local public policy decision-making. From the individual perspective, 6,282 current/new 4-H youth volunteers and 7,745 current/new adults indicated new knowledge gained regarding volunteerism. In addition, 2,679 current/new 4-H youth volunteers indicated positive attitude changes regarding volunteerism while 5,649 current/new 4-H adult volunteers indicated positive attitude changes regarding volunteerism.

b. Impacts: 3,188 4-H youth and 3,020 adults served in expanded and/or additional leadership roles in 4-H, in their communities, and in expanded teen/adult partnerships. 81 teen 4-H TRY-IT team members from 19 counties taught 4-H curricula to more than 1,689 younger youth statewide, contributing more than 900 hours valued at $15,471.

c. Scope: State specific.

KEY THEME: Building Strong Families

a. Issue: The family is the basic unit of society. North Carolina has a disproportionately high population of "working poor" families and is above the national average for the number of children living in single parent families. Many children and families have been removed from public assistance programs. To reduce some of the negative effects living in poverty, parents need opportunities to prepare them to meet the challenge that come with parenting.

North Carolina has had increasing number of substantiated child abuse and neglect cases (an increase of 23% in the past five years). According to Prevent Child Abuse North Carolina (2002), every five minutes a child in this state is abused or neglected.

Programs focused on child development and care, parenting, and family relationships. Programs reached diverse audiences including homeless families residing in transitional housing, grandparents parenting grandchildren, teen parents, Head Start parents, and mentally-challenged adults.

b. Impacts: One thousand eight hundred fifty (1850) limited-resource parents participated in educational programs. Of that number, 1072 limited-resource parents increased their knowledge of behaviors associated with nurturing children. Seven hundred sixty-seven (767) limited-resource parents reported adopting nurturing practices (such as using discipline with a balance between warmth and firmness, showing acceptance, love, and support of each child as a unique person). Two hundred sixty-six (266) limited-resource parents reported using age appropriate discipline techniques to establish and maintain reasonable limits with their children.

Four hundred eleven (411) limited resource court-mandated or Department of Social Services (DSS) referred parents participated in “Parenting Matters” training (NC A&T). Three hundred ninety-nine (399) limited-resource court-mandated or DSS reported improved interactions with their children. Four hundred (400) limited-resource court-mandated or DSS referred parents reported adopting nurturing practices (such as giving the child positive attention, showing patience, expressing affection in words and actions). Three hundred eighty-nine (389) limited-resource court-mandated or DSS referred parents reported using available resources to meet their needs.

Four hundred fourteen (414) limited-resource parents participated in educational programs designed to increase their knowledge and skills in reducing family conflicts and managing stress. Nine-nine of the participants reported increased knowledge and skills in stress, conflict, and anger management. Through reduced conflicts and improved family relationships these 99 families avoided $59,400 in costs associated with absenteeism from work due to domestic violence ($40 per day per family multiplied by 15 days). Two hundred sixty-eight (268) limited-resource parents reported using available community resources (such as assistance to families in providing for basic needs of food, clothing, and shelter).

c. Scope: State specific

KEY THEME: Resilient Youth, Families, and Communities

a. Issue: Resiliency is the ability to cultivate ones strengths to positively meet challenges. The North Carolina Resilient Youth, Families, and Communities Program is founded on a prevention model that strengthens youths “protective factors” and reduces “risk factors.” Participants bring together and involve numerous collaborators including: K-12 educators, researchers, youth serving and organizational

personnel, youth, families, community leaders, advocates and practitioners who share an interest in strengthening the resiliency of North Carolina's youth, families, and communities.

b. Impacts: Youth in 30 counties have benefited as a result of involvement in community-based programs, which focus on building resilience. More importantly, 5,415 youth have demonstrated increased life skills, 5,109 increased their academic performance, 2,078 engaged in fewer risk-taking behaviors, and in community service work. But perhaps, the most telling impact of this program is the 1,900 youth that experienced decreased involvement with juvenile courts in North Carolina in 2004.

c. Scope: State specific

KEY THEME: Youth Development

a. Issue: Youth development focuses on three major aspects of the 4-H program that contribute to the life skill and asset development of young people: the long-term 4-H Unit/Club, 4-H School Enrichment Program, and the Diverse Housing Program. Four major factors have been identified that contribute to the successful development of a child: social competence, problem solving, autonomy, and a sense of purpose and future. Those factors, along with the Search Institute's developmental assets, are incorporated into 4-H experiences. Through active 4-H participation youth learn to manage relationships, make decisions, become resilient enough to overcome the risks they face, become better communicators, and serve their communities. 4-H's hands-on, learn-by-doing approach reaches hundreds of thousands of North Carolina's youth each year in schools, in community clubs, camps, and in other settings.

A major goal of the 4-H Youth Development Program is to help young people develop life skills and assets that will allow them to become competent, caring and contributing members of society. In 2004, emphasis was placed on helping young people improve their life skills/assets in the areas of communication skills, cooperation, empathy and caring, critical thinking, planning and goal setting.

b. Impacts: During 2004, 4-H involved 181,145 young people between the ages of 5 and 19 in a variety of program areas; 113,863 youth participated in 4-H clubs and other long-term units, school enrichment, and diverse housing programs. The positive development of youth people through 4-H can be illustrated by the following impacts from selected programs: 1) 21,391 youth increased their communication skills; 2) 33,126 youth increased their decision making skills; 3) 32,970 youth increased awareness of and engaged in community service activities; and 4) 13,131 youth increased their leadership skills.

In 2004, North Carolina 4-Hers saved their communities over $315,401 by performing community service projects. As a result of their 4-H project work, $579,155 was earned, and $381,688 was saved by 4-Hers. In addition, 4-Her's received over $172,173 in scholarships to continue their education beyond high school.

c. Scope: State specific.

KEY THEME: Aging / Estate Planning / Retirement Planning

a. Issue: Many families struggle with managing financial debt and request assistance in acquiring new skills, adopting sound financial management practices, and developing personal and professional financial management habits that will make later years more financially secure. There were 51 extension units who

reported efforts to assist participants increase their financial management awareness and expand their skills concerning financial planning, estate planning for individuals as well as family-owned businesses, and retirement planning.

b. Impacts: There were 346 individuals who reported improved money management skills including implementation of a savings plan to increase their financial security in later years. There were also 2,601 participants who reported improved financial practices and knowledge gained through attendance at financial management sessions. Estate planning programs were conducted in ten counties and were developed to increase participant awareness and understanding about the benefits of estate planning as well as associated financial management topics including the need to save money for retirement and allow for mental incompetency in the future. Extension units reported that 185 limited resource (LR) and 424 non-limited resource (NLR) increased their knowledge about estate planning and an additional 720 people reported that they had increased their knowledge about the need to prepare for possible mental incompetency. As a result of programs, an additional 304 individuals developed an estate plan or who were executing estate planning documents as a result of attending an estate planning education program. Data revealed that 257 individuals reported executing legal documents to prepare for future incompetency and dependency. Finally, 332 people indicated that they will be developing estate and dependency plans appropriate for their particular circumstance.

c. Scope: State Specific

KEY THEME: Community Development

a. Issue: Continued loss of manufacturing jobs throughout rural North Carolina has strained community resources and reinforced efforts to expand development activities. A total of thirty-nine counties initiated efforts to: (1) increase citizen awareness of economic trends that affect local economies; (2) increase audience's capabilities and skills to participate in community development efforts; and (3) allow citizens to become better informed about implementing sustainable economic development programs. Local officials in eleven counties reported on efforts that encouraged development of home based business plans, encouraged new business start up enterprises, and actively participated in community economic development programs. Economic development programs provided one means that allowed local officials to become more aware of, better informed about, and more involved with community growth and change issues concerning land use, community infrastructure, and organizational leadership.

b. Impacts: In 2004, 1,594 communities engaged in community visioning, planning, and devising constructive solutions to community development problem solving. There were 821 people who reported that they increased their knowledge of economic development principles. The number of communities involved in community enhancement and revitalization efforts equaled 513. Communities reported that they saved $14,648,656 as a result of achieving successful resolution of community issues. Four businesses were retained or saved as a result of economic development programs and $215,000 in revenue was retained by local communities. During 2004 257 new jobs were created and 299 existing businesses expanded. There were 140 non-limited and limited resource new marketing venues established or sustained in 2004 that resulted in $10,000 in additional income generated. Business expansion resulted in an additional $18,113 in added funds available locally.

c. Scope: State Specific

KEY THEME: Community Development

a. Issue: Citizens from varying socio-economic levels gained skills and acquired knowledge that facilitated community problem solving. NC A&T led program efforts that helped rural communities who are increasingly expected to design more local solutions to problems and issues. There were 6,573 limited resource and other non-traditional participants involved in leadership training who demonstrated proper application of leadership skills and problem solving techniques. From this group of people, 1,140 were able to develop and implement action plans that resolved community problems. Eight hundred and thirty people who developed action plans identified themselves as limited resource participants while 310 people were nontraditional participants. A total of 184 community issues were resolved or completed.

b. Impacts: A total of 919 limited resource and nontraditional individuals increased their capacity to provide service to the community. Successful resolution of community issues resulted in $218,259 in additional savings available to local communities. To continue finding solutions to problems, individuals formed 133 new community organizations.

c. Scope: State Specific

KEY THEME: Family Resource Management

a. Issue: A total of fifty-one counties reported that they conducted programs to increase individuals' and families' knowledge of and ability to implement financial planning and money management techniques as well as adopt best management practices that would enable them to meet their changing needs and responsibilities over their life cycle.

b. Impacts: The number of North Carolina citizens who increased their knowledge and skills in goal setting, budgeting, and record keeping was 7,628 and the number of people who actually developed a money management plan was reported to be 2,659. An additional 1,885 people wrote down financial goals while 552 individuals also developed debt management plans during 2004. A total of 1,684 (794) reported a lifestyle change to improve their financial status. 1,061 individuals reported improved financial status due to adoption of practices and skills learned in workshops. There were 794 individuals who reduced debt loads by a reported amount of $102,556. Participants estimated savings to total $247,777.

c. Scope: State Specific

B. Stakeholder Input Process

North Carolina Cooperative Extension System has an active advisory leadership council for the state and for each of the one hundred counties and the Cherokee Indian Reservation. The Advisory Leadership System is a major partner in the continuous and dynamic review of program development including program planning, implementation, and assessment of Extension programs. The Advisory Leadership System has major responsibility in obtaining stakeholder input through out the program development process. Members of the State Advisory Leadership System and county Advisory Leadership Council represent geographical, cultural, ethnic, and economic diversity of the state's population. In addition to Advisory Leadership Councils, each county has specialized committees with responsibilities for review of overall programming, collaborating in needs assessments and environmental scans, and marketing

extension programs and impacts. These specialized committees provide specific program input for individual commodities, issues and ongoing program needs. Membership on both the council and the specialized committees represents the diversity of the respective county population including under-served populations and retired professionals from business, extension and other relevant organizations and agencies. While the advisory council will meet quarterly, the specialized committees will meet at least annually to discuss accomplishments and needs still to be addressed and techniques to market extension. This system is monitored administratively to assure that stakeholders provide such program input and actions.

At the state level, a statewide advisory council provides programmatic inputs, review and guidance for the overall program functions for the North Carolina Cooperative Extension Service at North Carolina State University. This group meets quarterly as will as for special meetings to meet organizational review and input needs. This council is made up of influential individuals who represent a broad scope of the diverse population in North Carolina and who have distinguished themselves as respected and responsible knowledgeable leaders who can provide local perspectives into a statewide organization. In addition to being an integral part of the overall State Advisory Council, the Extension Program at NC A&T State University is also guided by a cadre of citizens who make up the Strategic Planning Council. The Strategic Planning Council includes community leaders, collaborating agency and organization representatives and individuals representing non-governmental organizations.

The Strategic Planning Council meets three times a year. One joint meeting is held annually with the State Advisory Council. Networking and collaboration between the State Advisory Council and the Strategic Planning Council is facilitated by chairs of both advisory groups and as well as two members who serve on both councils.

Thus, Cooperative Extension has a planned, proactive process for ensuring significant stakeholder input into program direction. The process ensures that programs are reviewed and overall needs assessed on a continuous basis, but no less than once every two years. However, with the respective advisory groups functioning on a much more frequent basis, stakeholder input produces continuous program review, allowing for adjustments as local needs change.

To ensure appropriate, inclusive, and adequate stakeholder input, the organization implements an environmental scan in each county and on the Cherokee Reservation every other year. These scans are conducted by a diverse group of extension employees, volunteers, clientele, commodity groups, and county residents. The scans provide a wide base of needs, issues, trends, and emerging issues that are representative of diverse groups throughout the county.

To assure that all programs are current and highly relevant, in late 2002 North Carolina Cooperative Extension conducted a rigorous and detailed review of its major programmatic thrusts. The review process included departments at both universities (NC State and NC A&T State); the state's 100 county Cooperative Extension centers, the Extension Center on the Cherokee Indian Reservation; the state's Advisory Leadership System members; and local Advisory Leadership Councils for each of local administrative units. The dominant change was based on the review of the previous twenty state programs (Cooperative Extension Major Programs) and yielded a new program structure with five major focal thrusts for the total program and realignment of program development teams. The program development model with fifty program objectives was approved by Extension Administration.

The new program structure was reviewed by college, department, and county program groups. College department review included a number of stakeholder and commodity groups. A major thrust of the department reviews was the construction of a "Resource Book" which portrayed the current situation in content areas, the crucial needs and issues perceived to be most important in the next 3-5 years, and a description of how those needs and issues would impact programming at the county level. Major emphasis has been to include individuals and groups that have not been traditional Extension clientele. Advisory Leadership Councils in each local area are participated with Extension staff to identify and prioritize needs and issues.

In 2003, a needs assessment was completed in each of the 101 Cooperative Extension's county administrative units. The goal of the assessment was to continue to obtain stakeholders' input to ensure effective program priority setting. Each administrative unit conducted independent assessments using primarily: surveys, personal interviews and group meetings. Each unit prioritized the top ten needs/issues that stakeholders had identified. The County Extension Director in each unit appointed an advisory group to give oversight to the needs assessment. There were 2,190 individuals who were members of those advisory groups. Additionally, 1,152 groups were instrumental in the county assessments. Data were obtained from 23,362 individuals altogether.

During 2004, with increasing competition for funds at both the state and local levels, departments at NC State University and NC A&T University and each of the 101 local Extension administrative units reviewed progress toward goals that were established in 2003 after the statewide needs assessment. Departments and county administrative units adjusted program thrusts resultant of four programmatic reviews: (1) increasing emphasis on measurable program outcomes and impacts by local decision-makers; (2) Extension middle management's assessment of specialists and agents plan of work for the next year in terms of planned programs with articulated program outcomes and impacts; (3) Extension administrative review of success stories with measurable outcomes and impacts; and (4) results from a strategic planning group reviewing current programming results and a comparison of those results to measurable program outcomes suggested by a statewide formal education blue ribbon group. In each of the four reviews, clientele, state and county Extension faculty, Extension administrators, advisory leadership members, volunteers, corporate leadership, and consultants external to Extension identified major program foci and recommended program outcomes and impacts that are relevant to county, state, and federal decision makers.

C. Program Review Process

During the 2002-03 plan year, North Carolina Cooperative Extension conducted a rigorous and detailed review of its major programmatic thrusts. The review process included departments at both universities (NC State and NC A&T State Universities); the state's 100 counties including the Cherokee Indian Reservation; the state's Advisory Leadership System members; and local Advisory Leadership Councils for each of local administrative units. The Long Range Plan Steering Committee, with members representing NCSU and NC A&TSU, has traditionally functioned as the primary merit review group for the POW. With the change to fifty program objectives subsumed under five major focus areas, as indicated in the introduction of this report, the chairs of each of 50 plan of work objectives and their teams are now primary merit reviewers. Changes were made in the plan objectives during 2004 that resulted in the identification of stronger impact indicators for several of the objectives. The state program leaders and the assistant administrator for state programs have also intensified their leadership roles as key merit reviewers. The other merit review group is the AREERA Goal chairs. Collectively, these

individuals provide a significant internal merit review of programs taking into consideration the needs and expectations expressed in the stakeholder input process.

D. Evaluation of the Success of Multi and Joint Activities

Multistate:

For fiscal year 2004, NCCES had documented multistate activities using Smith-Lever B & C funds amounting to $461,192. This funding level exceeded the originally planned expenditure of $209,780 by $251,412. Altogether, the 2000 plan indicated 12 activities. Additional activities have been added for a total of 20 currently underway. One of the originally planned activities was reactivated, and another concluded, thereby making a total of 20 reportable multistate activities for 2004.

NCCES conducts a vast number of multistate collaborative programs including an array of programs undertaken by Extension agents in neighboring border states. Many of these agents are veteran agents who continue to be partially funded by Smith-Lever funds, but the fluidity of these county based programs from one year to the next precludes an opportunity for providing specific reports on all such activities, and are thereby not included in this report. Beginning with the originally identified 12 activities, additional major activities have been identified or initiated each succeeding year.

Also, Program 6 in Goal 1 was completed in 2002, with no additional funding required for 2003 & 2004. Efforts continue to expand current programs and identify additional multistate activities for meeting or exceeding the AREERA requirements. The key point is that NCCES has significant multistate activities underway on a continuous basis that strive to meet the needs of clients in a most efficient and effective manner. Some of these continuing programs are partnerships with only one other state, while others are with a vast number of states. Utilization of scarce resources by pooling expertise and conducting Extension programs across state lines is an integral part of the NCCES mission and continuing opportunities shall be sought and subsequently reported.

Evaluation of the multistate activities is an ongoing function of program leaders and other administrators of NCCES and other states, as well as by users and cooperators with whom the multistate activities are focused upon. Such evaluations as to the utility of current activities and expansion of such activities shall be a continuous function of NCCES and our multistate partners.

Integrated:

Altogether, NCCES and NCARS fund more than 100 integrated Research- Extension projects. Of those projects, 55 had significant Smith-Lever B & C funding allocated for all or part of the Extension funding in 2004. For fiscal year 2004, these B & C funds amounted to $2,128,837. This funding level continued to exceed the originally planned expenditures for Integrated projects that has occurred over the span of the planning cycle. For 2004, the original plan called for an expenditure of $1,819,423. The actual expenditure exceeded the plan by $309,414. This 2004 expenditure exceeds the prior year by $76,822. This is a slight increase in both projects and funding level from the 2003 fiscal year.

While the integrated projects have a greater focus on Goals 1 and 4, some projects are reported under Goals 2 and 5 as well. Two projects are now listed under Goal 3. All of these projects represent goals to achieve scientific breakthroughs for production efficiencies, environmental protection, life enhancement, stronger communities, and alternative uses of products to achieve a greater contribution to the economic, environmental and quality of life benefits to society. These integrated programs strive to gain new and improved technological advancements that can be communicated and applied to meet the needs of the population as a whole as well as for those individuals and organizations who adopt the new advancements.

These integrated projects have been developed using stakeholders inputs and are evaluated to assure that all programs represent the needs of the people of the state in protecting its environment, increasing its economic well being and enhancing the society in which the state's population lives. Needs assessments and stakeholder involvement helps to establish priority projects for funding. Efforts are made to address the needs of all of the state's citizens, with these programs effectively communicated via Extension programs to under-served and other citizens of the state who can utilize the findings for enhancement of the quality of their lives.

E. Multistate Extension Activities

Goal 1. AN AGRICULTURAL SYSTEM THAT IS HIGHLY COMPETITIVE IN THE GLOBAL ECONOMY

Program 1.

SERA-IEG
Competitiveness and Sustainability of the Southern Dairy Industry

Amount funded: $8,100

Report: This SERA is scheduled to run through 9/08. A major activity of the this SERA in 2004 was planning and conducting the Southern Dairy Conference held in Atlanta in February, 2004. The agenda included information on milk marketing issues, new dairy processing technology, public policy, obesity & health issues, biosecurity, and attracting new dairy farm ventures. A meeting of the SERA-IEG was held in conjunction with the conference to exchange information on research and extension activities and to discuss regional collaboration in support of the economic, profitability and sustainability of the regional dairy industry.

Program 2.

Regional Orchard Floor Management Program

Serves the educational needs of apple growers in the North Carolina, South Carolina, Georgia and Tennessee mountain region.

Amount funded: $14,946

Report: This project continues as a viable multi-state Extension program even though it had no staff from 2000 until 2004. However, while it had been dropped as a multistate program, once funding was restored and staff was hired, the program was reinstated for the full 2004 fiscal year and is expected to continue as a viable multistate program. This program includes ongoing evaluation of high-density apple orchard systems utilizing dwarf rootstocks with the cultivar 'Golden Delicious'. High-density orchard systems showed greatly enhanced productivity 14 years after planting (sustained at over 1000 bu/A 47,000 kg/ha), far outperforming the productivity of central leader, semi-dwarf orchard systems which are the current industry standard in the Southeast. New apple cultivars were evaluated with respect to their suitability for the region, and appropriate management techniques developed for the most promising cultivars. On-farm trials were also utilized throughout the region in close collaboration with participating growers as a technology transfer agent to demonstrate the benefits of promising new technologies for enhancing fruit quality and/or production in a commercial context. An Integrated Orchard Management Guide for Commercial Apples in the Southeast was developed, updated and disseminated to all commercial apple growers in the Southeast.

Program 3.

Southern Region -ASHS Strawberry Plasticulture Working Group & Southern Region Small Fruit Consortium

This program provides grower workshops and agent training programs throughout the Southern Region and Midwest.

Amount Funded: $56,002

Report: In 2004, the NCCES program specialist in strawberries provided 8 out-of-state Strawberry plasticulture Workshops and Agent In-Service Trainings in Virginia (2), Georgia (2), South Carolina (2), and Arkansas (2). There were more than 400 producers and agents directly impacted by those meetings in these other states in 2002. A CUE application for methyl bromide for 2006 was submitted to US-EPA for a Southeastern Strawberry Consortium of 12 states in August 2004. The BERRYagent web site (<http://intra.ces.ncsu.edu/depts/hort/berrydoc/>http://intra.ces.ncsu.edu/depts/hort/berrydoc/), was converted to http://www.berryalert.org, and continues to provide critical information to agents and farmers throughout the Southern Region on frost/freeze events, pest management strategies and marketing information. A new Southern Region ASHS working group has been formed by strawberry extension specialists in several southeastern states to focus on multi-state educational programs for strawberry plasticulture, and to initiate professional training programs for county and area agents with responsibilities for strawberry plasticulture.

Program 4.

Pork Information Gateway

A consortium of states involved in developing electronic references, educational materials and frequently asked questions for pork producers across the country.

Amount funded: $35,300

Report: The Pork Industry Handbook (PIH), a national continuing educational effort on all phases of pork production has become a central component of the Pork Information Gateway (PIG). The PIG is a multidisciplinary project with over 80 authors and reviewers that include animal scientists, veterinarians, ag engineers, ag economists and pork producers from 45 states. It is currently estimated that 99% of all the hogs produced in the United States come from production units that utilize some or all of the PIG fact sheets. In addition, the PIH is used as a textbook in over 100 college courses on pork production at nearly 70 colleges and universities in the U.S. Major efforts have been in developing electronic and interactive resources and the development of frequently asked questions tied backed to the original resource materials. States that have representatives directing the program through the Editorial Board include: North Carolina, Indiana, Nebraska, Illinois, Oklahoma, Iowa, Michigan, North Dakota, Ohio, Missouri, Georgia and Kansas.

Program 5.

Vegetable Crop Guidelines: For the Southeastern U. S.

This program involves the development and maintenance of an up-to-date technical and educational guide for commercial growers in North Carolina, South Carolina, Georgia, Alabama, Mississippi, and Louisiana.

Amount Funded: $36,407

Report: Coordinated efforts for a regional (NC, SC, GA, AL, MS, LA) vegetable production guide pest management supplement for 25 major vegetables and assisted with planning and conduct of a SE regional meetings of all Ext. Vegetable Specialists to develop production recommendations. As part of this program we conduct a 2 day workshop for specialists from these states and KY, LA, TN and FL to share recommendations, research results and cooperate in program planning.

Program 6.

SARE Professional Development Program

The SARE Professional Development Program involves growers and faculty from all Southern Region states for preparing traditional providers for delivery of sustainable agriculture Information.

Amount funded: $0

Report: The outcome of this program should improve collaboration among stakeholders-especially among traditional information providers (CES, NRCS) and non traditional sources of sustainable agriculture information, identify ways to familiarize agents with the depth and breadth of sustainable agriculture materials available, and identify the means for making those materials more readily accessible through creative use of web-based electronic resources. This project ended in 2002.

Program 7.

Pork Production Curriculum Project

Course curriculums are being developed and implemented for all phases of pork production that are designed to address the basics of day-to-day management activities. The basic management principles are similar no matter what type of facility the grower may be using or how large or small the size of the unit. The intended audience for these curriculums is the group of people who work in the production of any type, size or kind size of pork production operation. The student may be an employee in contract production or an owner-operator. States participating include: North Carolina, Ohio, Minnesota, Tennessee, Alabama, Nebraska, Indiana, Iowa, Illinois, Maryland, Washington, South Dakota, Kansas, Georgia, Kentucky, Virginia and Pennsylvania.

Amount Funded, $28,597

Report: Over 2,500 production management curriculums covering 8 different subject matter areas were developed and distributed nationally to producers and educators on CD-Rom. A certification program for pork producers is being developed that will be support by these learning modules. These curricula and instructional materials were used in swine production courses and in training producers and employees in extension programs in 28 states.

Program 8.

National Swine Educators Conference:

The National Swine Educators Conference is a national continuing education program to provide in-service training and materials to personnel involved in providing education and outreach programs to pork producers in the United States. States participating include: North Carolina, Ohio, Minnesota, Tennessee, Alabama, Nebraska, Indiana, Iowa, Illinois, Maryland, Michigan, Missouri, Wisconsin, Washington, South Dakota, North Dakota, Texas, California, Utah, Oklahoma, Arkansas, Kansas, Georgia, Kentucky, Virginia and Pennsylvania.

Amount Funded: $7,000

Report: The National Swine Educators Conference was planned by a representative from each pork producing states and producer education personnel from the National Pork Board. North Carolina sent eleven participants to the 2003 Swine Educators Conference with the support of the NC Pork Council. These educators have in turn provided training to NC pork producers. The over 150 educators at this conference represented Cooperative Extension, University Academic Programs, Community Colleges and Vocational Agriculture Instructors. The program provided in depth training on the latest technologies and provided participants with teaching curriculums and resource materials that could be used in their local programs.

Program 9.

Title: Southeastern Dairy Youth Retreat and Youth Dairy Judging

The Southeastern Dairy Youth Retreat is an annual event that is hosted by North Carolina, Virginia, South Carolina, Georgia and Florida on a rotation basis. Youth participate in many dairy educational events including farm tours, judging, quiz bowl, skill-a-thon, seminars and other activities. Youth dairy judging teams participate in this even as well as in other state events in Maryland, Kentucky, Pennsylvania and Wisconsin. (Plan added beginning 2002).

Amount Funded: $17,280

Report: Twenty-three (23) youth and adults from North Carolina participated in the 2004 Southeastern U. S. Dairy Youth Retreat held at Virginia Tech in Blacksburg, VA. Youth from NC, SC, VA, GA, and FL participated in this annual educational retreat. Through educational workshops, dairy farm tours and other events and activities, youth increased their knowledge of the dairy industry in the Southeastern U.S. Also, Youth dairy judging teams participate in this even as well as in other state events in Maryland, Kentucky, Pennsylvania and Wisconsin.

Program 10.

A regional SARE Dairy project

Description: "An evaluation of pasture-based dairy systems to optimize profitability, environmental impact, animal health, and milk quality." This project includes a significant extension component which likely will continue through 2007. Extension program activities will include planning and conducting a multi-state conference every other year along with farm tours, field days, multi-county meetings, and on-farm farmer discussion groups. These efforts will feature various aspects of pasture-based dairying, including such topics as nutrient management, forage types, stocking rates, pasture management, breeding systems, pest management, soil health, and milk quality. The project includes NC, SC, and VA. (Plan added beginning 2004)

Amount Funded: $12,900

Report: An in-service training was held over a 4-day period in TN for a group of 30 extension and NRCS workers from TN and AL in May, 2004. Similarly, information on the project was shared in one day session to another group of 25 NRCS workers from around the nation plus 5 extension agents from NC. A major outreach effort included planning and conducting the Mid-Atlantic Dairy Grazing Conference in VA in June, 2004 in cooperation with the American Forage and Grassland Council's (AFGC) annual conference. This event was attended by over 400 farmers, scientists, and other professionals from around the country. The total AFGC group toured one of our cooperating pasture-based dairy producer's farms in VA as part of a general tour. About 80 dairy farmers and other professionals participated in specific pasture-based dairy educational programs at the AFGC conference site and on two cooperating dairy grazing farms in the area. Other educational programs included providing information to 13 student interns and to over 100 other visitors to the Center for Environmental Farming Systems site at various times as well as an update in the Fall, 2004 Dairy Extension News to approximately 500 dairy farmers and dairy professionals.

Goal 2. A SAFE AND SECURE FOOD AND FIBER SYSTEM

Program 1.

The Poultry Food System: A Farm to Table Model

The primary objective of this multi-state project is to improve consumer safety, consumer acceptance and the commercial profitability of poultry meat and eggs by improving or reducing critical problems associated with the quality of poultry meat and eggs; specifically color, flavor, or texture of the product, and the safety of poultry meat and eggs; specifically colonization, contamination, and subsequent pathogen growth. Twelve states are involved.

Amount funded: $47,932

Report: To improve consumer safety, acceptance, and the commercial profitability of poultry meat and eggs, faculty from NCCES have been collaborating with investigators from twelve states. In three collaborations between NCCES and Clemson, studies have continued to evaluate the efficacy of *Campylobacter jejuni*-specific nanoparticles to prevent colonization of *C. jejuni* in the gastrointestinal tract of broilers. Several *in vivo* trials were successfully conducted to test this hypothesis. In the second collaboration, the efficacy of combining in-package heat pasteurization and inhibitory packaging films on eliminating *C. jejuni* and enteropathogenic *E. coli* from ready-to-eat poultry products was assessed. The third collaboration involves eliminating *Listeria monocytogenes* in packaged, ready-to-eat poultry products using a combination of heat, lysozyme, nisin and modified atmosphere packaging. In a collaboration between NCCES and Ohio State University, we are seeking to establish the relationship of animal production/waste management practices to the fate of bacterial and viral pathogens that pose a potential risk to humans via contamination of ground and surface waters. Each of these on-farm or in-plant strategies is anticipated to ultimately reduce the incidence and prevalence of these pathogens in poultry products, other foods, and the environment.

Goal 3. A HEALTHY, WELL-NOURISHED POPULATION

Program 1.

Partners in Wellness

Nutrition education for the elderly, a program involving North Carolina and other states in a collaborative arrangement for program development and implementation of nutrition education materials for older adults.

Amount funded: $20,000

Report: NCCES has maintained a relationship with other states (such as the University of Georgia at Athens, Iowa, and Kansas State University) with whom we have shared the Partners in Wellness program curricula and, in turn, have received curricula or materials. We continue to collaborate with states including conference calls, discussions at meetings, and sharing materials. We continue to benefit from the materials and ideas shared with us and continue to maintain a Partners in Wellness website for information for our partners and to market our program to others. The Partners in Wellness program funding ended in September, 2004. The program will continue to be delivered across North Carolina however will not be able to maintain development and sharing of materials with other states unless additional funds are sought.

Program 2.

Elderly Nutrition Extension (ENE) Core Group

A national core group or task force focusing on planning curricula, program delivery means and expertise in elderly nutrition programs. The states of North Carolina, Texas, Florida, Kansas, Missouri, Ohio, Iowa, and Virginia have professionals who participate on conference calls and meetings on an as need basis.

Amount funded: $23,771

Report: NCCES faculty chair the Elderly Nutrition Education (ENE) Core Group. The coordinating core group is composed of members from North Carolina State University and from Meredith College in North Carolina, Florida International U., St. Louis U in Missouri, Kansas State U., the USDA/Food and Nutrition Service, , the University of Georgia, Texas (retired Extension Nutritionist), Iowa and Ohio (retired Extension Nutritionist). Our goals are to advance the understanding, research base and promotion of nutrition education for the older adult audience. This group's efforts this year included holding a post symposium, "Federal and Local Nutrition Programs for Older Adults: Creating Opportunities for Collaboration," at the annual meeting of the Society for Nutrition Education.

Goal 4. AN AGRICULTURAL SYSTEM WHICH PROTECTS NATURAL RESOURCES AND THE ENVIRONMENT

Program 1.

Regional Forestry position

A consortium of all Southern Region states for forestry program leadership and coordinative efforts in linking programs from each state to more effectively streamline the flow of information across the region.

Amount funded: $12,961

Report: This position has facilitated the implementation of communication among the various states in the Southern Region, assisted with the development of regional NREM programming presence and recognition, instrumental in the creation of a national organization representing natural resources extension programs. These efforts have created better collaborations and understanding among diverse program areas, including enhanced partnership for states with the US Forest Service.

Program 2.

Environmental Protection Agency liaison Specialist

A consortium of 8 Southern states for coordinating Extension programs with EPA and other federal agencies relating to the environment.

Amount funded: $10,463

Report: This position has served as an information broker for directors and program leaders on water quality and other related environmental issues. There has been promotion of training and other conference opportunity which enhances each states ability to collaborate on water quality issues and communicate with EPA.

Goal 5. ENHANCED ECONOMIC OPPORTUNITY AND QUALITY OF LIFE FOR AMERICANS

Program 1.

Southern Rural Development Center

Programs focus on fostering the economic and community development in the rural South.

Amount funded: $5,000

Report: The Southern Rural Development Center has greatly enhanced the capability and effectiveness of Cooperative Extension in the Southern Region as a whole by coordinating and facilitating conferences and meetings. In 2001, this center became a part of a newly reorganized leadership role for Extension for all of the Southern Region. The functions of the center have been subsumed under the duties of the Executive Director, ASRED. In 2004, $20,000 was expended for this effort, of which $6,666 was for providing program support.

Program 2.

School Age Child Care

A multistate program dealing with the educational needs of school age youth called 4-H Afterschool. A collaborative project of National 4-H Council and the Cooperative Extension System focused on enhancing the quality of state-level training and technical assistance and county-level program delivery in afterschool programming for school-age children and teens. The performance goals are to: increase the quality, affordability, accessibility, availability and sustainability of child care for school-age care for children and youth, and programs for teens in out-of-school time.

Amount Funded: $48,300

Report: This program is focusing on training Extension educators in the Southern Region during 2004, and grant development. 4-H faculty participate in monthly teleconferences directed toward implementing 4-H programs in after school settings and consults with staff of the Extension Cares Initiative and Rural Youth Development Evaluation Group on program evaluation for the 4-H Afterschool provider training. The Evaluation Committee of the School-age Initiative is charged with developing instruments and a web-based system of data collection on provider training conducted by Extension professionals. Committee members are responsible for implementing this plan in their state and acting as liaison with ECI/EC on challenges and opportunities. The Evaluation Committee also consults with individual states and agents to provide technical assistance on evaluating impacts of after school programs with youth and families. North Carolina State faculty participated in monthly teleconferences, provided research-based

information on program evaluation, after school programming, and youth development to the project team.

Program 3.

4-H Volunteer Leadership Development Forum
A multistate program designed to train more effective leaders for youth programs.

Amount funded: $41,033

Report: North Carolina 4-H staff served in an advisory capacity for the host state (Florida) for the 2004 fiscal year on the Regional Planning Committee. In this capacity, electronic files were shared, multiple teleconferences were held and additional correspondence was required to insure a smooth transition for donor and budget accountability. Additionally, North Carolina staff managed first timers orientation at the Forum event Some assistance with teaching materials and resources for these workshops, particularly those conducted by volunteers, is provided through the state 4-H staff. The 2004 delegation consisted of 68 North Carolina 4-H staff and volunteers with a total of 19 of the 80 workshops provided by North Carolina participants. One volunteer continues to serve on the Regional Planning Committee and is assisted as needed by state staff.

Program 4.

National Parent, Family Editorial Team for the Children, Youth and Families Extension Network.

Amount Funded: $10,600

Report: The CYFERnet Parent/Family editorial board conducted the Focus Group at CYFAR 2004 Conference with users of the data base. Based on their input, several additions were made and marketing efforts will be more targeted. The Editorial board re-designed, updating and improved the database. The Parent/Family section has a total of 1976 resources; 3265 by category (higher number due to cross-listing of some resources). The current focus is on locating resources for categories with less than 10 resources; there are currently only 12 resource categories with less than 10 resources. Presented a workshop at CYFAR 2004 with members of the CYFERnet-Parent/Family Editorial Board, “Brrrr . . . Take the Chill Off an Audience with Activities and Icebreakers”. Eight members of the board attended and co-presented the workshop. All resources developed in conjunction with this workshop have been reviewed and added to the CYFERnet database. Interactive telephone trainings conducted by members of the CYFERnet Parent/Family Editorial Board include Coping With Separation and Divorce, Marriage and Couples Education, Intentional Harmony: Balancing Work and Life.

Program 5.

National Extension Parenting Educators' Framework

Amount Funded: $9,600

Report: Through collaboration with seven universities and CSREES-USDA, a national framework has was developed and published (www.ces.ncsu.edu/depts/fcs/NEPEF) on the NC State University server

and in hard copy as a technical report. The framework was then extended to develop online learning modules for Extension professionals. Entities involved include Ohio State, NCSU, U. of Arkansas, U. of GA, Oregon State, U of CT., Purdue, and CSREES-USDA. This program was completed in 2002 and a website was posted in 2003. Dr. DeBord continues in her leadership role with this project.

Program 6.

Extension CARES for America's Children and Youth

A National Initiative of the Cooperative Extension System that improves child care and youth programs for infants and toddlers, preschoolers, school-age children and youth, and teens in out-of-school time. The performance goals are to: increase the quality, affordability, accessibility, availability and sustainability of child care for infants, toddlers, and preschoolers, school-age care for children and youth, and programs for teens in out-of-school time.

Amount Funded: $15,000

Report: the Extension Cares Initiative essentially concluded in 2004 (only their database is maintained at MS State and GA) but the 4-H After school group has emerged to replace and incorporate the remnants of the Extension Cares Initiative.

Summary:
Total Extension Multistate Programs listed, with 1 completed: 21 total
Total Smith Lever B & C funding planned: $209,780
Total Smith Lever B & C funding allocated to 20 programs for FY 2004: $461,192

U.S. Department of Agriculture
Cooperative State Research, Education, and Extension Service
Supplement to the 5-Year Plan of Work
Multistate Extension Activities and Integrated Activities
(Attach Brief Summaries)

Institution N.C. Cooperative Extension Service
State North Carolina

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	FY2001	FY2002	FY2003	FY2004
Goal 1. A highly competitive Agricultural System	42,695	117,626	161,919	167,970	216,532
Goal 2. A safe and secure food	0	48,950	48,800	46,435	47,932

and fiber system					
Goal 3. A healthy, well-nourished population	**40,040**	**43,994**	**44,374**	**44,721**	**43,771**
Goal 4. An Agricultural system protecting natural resources and the environment	**17,471**	**19,655**	**16,835**	**16,835**	**23,424**
Goal 5. Enhanced economic opportunity of quality of life	**56,017**	**92,156**	**88,924**	**95,437**	**129,533**
Total	**$156,223**	**$322,381**	**$360,852**	**$371,398**	**$461,192**

Jon F. Ort
Director

3/22/05
Date

Form CSREES-REPT (2/00)

F. Integrated Research and Extension Activities

The following is the project/program names and brief descriptions of the NCCES Integrated Extension-Research programs, broken out by the respective Goal

GOAL 1. AN AGRICULTURAL SYSTEM THAT IS HIGHLY COMPETITIVE IN THE GLOBAL ECONOMY

Integrated Project	***Project #***
Disease management of ornamentals in greenhouses and nursery crop production	**6683**
Orchard systems and production for a successful apple industry	**6758**
A national model for agroecology instruction	**8900**
Production strategies for improved vegetable production and alternative crops for diversification	**6596**
Rotational and compost systems in vegetable nutrient cycling	**6380**
Weed management for small fruits and vegetables	**6735**
Weed management in turfgrass and forages	**6704**

Genetic and production environmental influences on processing and planting quality of nutritionally enhanced soybean seed	**6632**
Precision agriculture for agronomic crops and nitrogen management for corn in Eastern NC	**6425**
Development and refinement of strategies for peanut production in NC	**6466**
Developing new crops and sustainable production systems for vegetables and medicinal herbs	**6595**
Rootstock and interstem effects on Pome and Stone fruit trees	**1840**
Farming system impacts on strawberry and tomato diseases and soil microbial ecology: short and long-term	**6641**
Management of arthropod pests of turf and peanut	**6731**
Ecology and management of European corn borer	**0205**
Weed management and growth regulators for agronomic crops	**6417**
Plant nutrition programs for mountain crops	**6558**
Cultural management of strawberries and grapes	**6324**
Economic evaluation of technical change in cotton, and peanut production	**5735**
Small fruit production systems	**6681**
Integrated peach disease management	**6160**
Management of arthropods on fruits and vegetables and Western North Carolina	**6402**
Crop improvement strategies	**6515**
Risk aversion, risk shifting and alternative payment mechanisms in settlement of broiler contracts	**6527**
Economic decision support for sustainable ag products	**6528**
Use of alternative supplements in grazed, hayed and ensiled forage systems for beef cattle	**6736**
Nutritional strategies to improve the growth, productivity, and profitability of dairy cattle	**6605**
Improving reproduction and management of dairy cattle	**6600**
Mycotoxins and their effects on dairy cattle	**6348**
Genetic improvement in pork production systems and understanding genotype by environmental interaction	**6496**
Nutrient requirements of swine for profitable production	**6495**
Maximization of laying hen performance economic return, and egg quality	**6184**
Fish food ingredients produced by solubilization/reprecipitation	**6616**
Mountain aquaculture research	**6153**
Strategies to increase meat goat production	**6701**
Integrating crops and livestock systems	**6602**
Price risk management strategies in food and grains marketing	**6510**
Economics of adoption of agricultural technologies	**6610**

Disease management of ornamentals in greenhouses and nursery crop production
Project 6683

In 2004, infected nursery stock was inadvertently shipped from California and Oregon to nurseries throughout the United States including North Carolina. Of the over 17,000 plants shipped to North Carolina from the California site, approximately 6,000 plants had already been sold by the time the problem was discovered. Many native and commonly grown landscape plants in North Carolina are known to be susceptible to this pathogen. There is a risk that an infected plant may have been placed into the landscape. Diagnostic services were provided to the NCDA&CS as part of a National SOD Nursery Survey. *Phytophthora ramorum* was detected in nine nursery locations in North Carolina. There was no evidence of this pathogen in any of the nursery samples collected as part of the National SOD Survey. At this time, all suspect or plants confirmed positive for this pathogen have been destroyed. Based on the nursery perimeter surveys, *P. ramorum* has not spread to any native vegetation outside the nurseries.

Orchard systems and production for a successful apple industry
Project 6758
This program includes ongoing evaluation of high-density apple orchard systems utilizing dwarf rootstocks with the cultivar 'Golden Delicious'. High-density orchard systems showed greatly enhanced productivity 14 years after planting (sustained at over 1000 bu/A 47,000 kg/ha), far outperforming the productivity of central leader, semi-dwarf orchard systems which are the current industry standard in the Southeast. New apple cultivars were evaluated with respect to their suitability for the region, and appropriate management techniques developed for the most promising cultivars. On-farm trials were also utilized throughout the region in close collaboration with participating growers as a technology transfer agent to demonstrate the benefits of promising new technologies for enhancing fruit quality and/or production in a commercial context. An Integrated Orchard Management Guide for Commercial Apples in the Southeast was developed, updated and disseminated to all commercial apple growers in the Southeast.

A national model for agroecology instruction
Project 8900
The National Research Initiative experiment at the Center for Environmental Farming Systems requires the design of an extensive pest monitoring system for multiple crops. Designed and implemented a pest monitoring system for the large-scale, long-term systems experiment at CEFS. A unique plan was required for corn, soybeans, and sweetpotatoes. Pest prediction and tracking through pest alerts and web based systems have received high priority as clientele are quickly adopting this technology and appreciate the immediate availability of information. A risk index was developed to aid growers in identifying which fields were unlikely to have Southern corn rootworm problems. Growers are able to withhold treatment from low risk fields and consider applications to high-risk areas.

Production strategies for improved vegetable production and alternative crops for diversification
Project 6596
To meet increased demand for seedless watermelons, commercial seed companies developed new pollinizers that take up minimal space and increase production on a per acre basis, but information as to whether pollinizers will work in a commercial watermelon production system on a consistent basis is lacking. Pollinizer tests in 2003 indicated that an increased yield of seedless watermelon of between 10 to

25 percent could be realized using this method. However, another test in 2004 showed no benefit from dedicated pollinizers compared to traditional pollinizers. In fact, some growers reported that dedicated pollinizers were ineffective as pollen sources. Based on 2004 results, growers should exercise caution in using dedicated pollinizers.

Rotational and compost systems in vegetable nutrient cycling
Project 6380
Studies of the use of various types of compost to enhance soil microbe development were completed. The use of reactor-treated composted swine waste resulted in some crop yield reduction. Controlled microbiotic compost improved crop growth and yield in the fifth year. Compost evaluation will be continued in another study to determine if compost can be an alternative to methyl bromide.

Weed management for small fruits and vegetables
Project 6735
Research identified control measures for nutsedge and Palmer amaranth, both troublesome weeds in sweet potatoes. Emergency registration packages for the use of Sandea herbicide for nutsedge and Dual herbicide for Palmer amaranth were prepared and submitted to the North Carolina Department of Agriculture and Consumer Services. Growers are now able to save millions of dollars by controlling Palmer amaranth and yellow and purple nutsedge before these weeds cause devastating effects to yield and quality of sweet potatoes.

Weed management and turf grass and forages and plant growth regulators for use in turf
Project 6704
Research is shedding light on why weeds occur where they do in turfgrass systems. Many cultural practices influence weed occurrence. These include irrigation practices as well as design features such as topographic issues. Research shows know that many troublesome sedges occur where water drains on golf courses. Better drainage and design will help reduce weed incidence and thus reduce reliance on herbicides.

Genetic and production environmental influences on processing and planting quality of nutritionally enhanced soybean seed
Project 6632
Soybean and peanut phytotron studies were completed in 2004. These studies evaluated the influence of temperature during seed development on subsequent seed quality of high oleic soybeans and peanut varieties. Field studies were also conducted in 2004. The final field study of soybean planting date, row width and harvest date was planted, while analysis will be completed in 2005. The final field study to evaluate planting date and harvest date influence on high oleic peanuts was conducted, with samples to be processed and analyzed in 2005.

Precision agriculture for agronomic crops and nitrogen management for corn in Eastern North Carolina
Project 6425
Soil tests for mineralizable nitrogen have the potential to predict how much nitrogen to apply at planting, 3) the remaining nitrogen can be applied as late as stage VT without reducing corn yield, 4) remote sensing of corn color using an infrared photograph of the field can accurately predict how much nitrogen to apply at VT, 5) a model for predicting corn nitrogen fertilizer requirements was successful when used

on farmer fields, and 6) nitrogen management systems using both an early and late application based on soil tests and photographs of the field at VT reduced the amount of nitrogen required to grow corn and reduced nitrates in the ground water. Growers using this system can decrease nitrogen requirements by 5 to 10% while actually increasing yield particularly in years with drought stress.

Development and refinement of strategies for peanut production in North Carolina
Project 6466

Results of tillage studies indicate that reduced tillage systems can be as successful as conventional tillage systems for peanuts in some but not all situations. It appears that peanuts produced in reduced tillage systems on coarse-textured soils respond equally as well as conventional tillage systems. In contrast, positive peanut response to reduced tillage systems on fine-textured soils may be less consistent. A risk advisory was published in 2004 to assist peanut growers in transitioning to reduced-tillage systems. Research also suggests that twin-row seeding can increase yield in some but not all situations, and that tomato spotted wilt virus incidence will be lower in twin-row plantings compared with single-row plantings. These data have been used to develop a multi-state risk advisory to help producers manage tomato spotted wilt. Interactions among agrichemicals were defined in numerous experiments, which will lead to a better understanding of why pest control practices fail in some instances and will help producers use crop protection chemicals more efficiently. An extension guide was published in 2004 to address the issue of agrichemcial compatibility.

Developing new crops and sustainable production systems for vegetables and medicinal herbs
Project 6595

Faculty facilitated a contract between growers and buyers of medicinal herbs. Seventeen growers and five buyers participated in the project. Buyers advised on herbs to be grown, how to handle and test the herbs, and quality issues. Growers produced California poppy, valerian, Echinacea purpurea and dandelion. Faculty provided farmers with assistance in growing and marketing their crops. Soil testing, tissue analysis and heavy metal testing of the herbs were also provided. A special effort was made to use farmers' existing equipment to handle the herbs. Many of these crops are still growing and will be harvested in 2005. Some harvested crops are in the process of being sold. There were some successful crops and profitable sales. For example, six California poppy growers grew, harvested and sold their herbs to buyers. The prices paid to the growers for dried material ranged between $8 - $9 per pound. Budgets are being developed that will show the costs of production and potential profitability of some of these crops.

Post-harvest quality maintenance of horticultural crops; influence of orchard management on tree growth; rootstock and interstem effects on pome and stone fruit trees
Projects 6717, 6196 and 1840

Faculty conducted research to address major horticultural issues limiting tree fruit production in the Southeast. Educational programs were developed for growers and potential growers that provide the latest production information available on horticultural management. Educational programs have taken the form of publications, educational meetings, field days, tours and on-farm demonstrations. As a result, traditional fruit growers are adopting and planting newer rootstocks in higher density systems with higher value cultivars that have a greater potential for consistent cropping and higher economic returns.

Farming system impacts on strawberry and tomato diseases and soil microbial ecology: short and long-term

Project 6641
Interdisciplinary, multi-state and (stakeholder) participatory research, extension and educational programs were implemented to evaluate, adopt and develop alternatives to the use of methyl bromide in strawberry and vegetable production systems. From 2000-2004, 37 Phase I trials (research conducted on research stations to evaluate new products or farming practices) and 22 Phase II trials (on grower farms) were implemented. Results were translated to key stakeholders through grower field days, agent training programs and presentations at extension conferences. More than 42 research and extension articles or abstracts were published. Results were translated to key stakeholders through 11 field and agent training programs and more than 21 presentations at grower meetings and commodity conferences. Research projects focused on development of integrated approaches to manage key soilborne pests.

Management of arthropod pests of turf and peanut
Project 6731
Research focused on the impact of using various management strategies to minimize the incidence of tomato spotted wilt virus in peanuts. An additional study focused on the incidence of southern corn rootworm injury as related to soil characteristics, variety selection and planting date and yield impact. A publication focusing on the tomato spotted wilt virus advisory was published and was widely used by growers. This research and extension effort has produced a rootworm advisory that provides sound decision-making principles for southern corn rootworm insecticide use. The tomato spotted wilt virus risk index has been validated and presented to growers. Its full implementation took place in 2003, and research indicates that by selecting the appropriate complement of cultural practices in 2003 and 2004 growers may have reduced the incidence of tomato spotted wilt virus in peanuts by more than 50 percent.

Ecology and management of European corn borer
Project 0205
Field tests using seed coatings to protect corn from wireworms and southern corn billbug indicated that two chemical coatings, clothianidin and thiamethoxam, effectively protected corn from these pests. Both treatments were commercialized for the 2004 growing season. A vigorous outreach campaign educated growers, county agents and dealers of the advantages of this new technology. Insect control, human safety, and the environment are all benefiting by replacing old insecticides with clothianidin or thiamethoxam seed coatings on planted corn seed. The new products also save time and effort. New seed treatments are priced competitively with the older products but benefit the grower with improved yields. Tests showed that insect control was equal to or better than older standard granular insecticides.

Weed management and growth regulators for agronomic crops
Project 6417
As more herbicide-resistant crops are grown, problems with volunteer crops increase. Effective strategies were developed to control volunteer Roundup Ready cotton in Roundup Ready soybeans and vice versa. Additionally, extensive use of herbicide-resistant crops and the associated limited spectrum of chemistry can and has led to weed shifts. Research has identified suitable herbicide combinations to slow or prevent weed shifts. Scientists have also identified a new invasive species that could potentially be devastating in current herbicide-resistant crop management strategies. A control program has been developed and is ready to implement it if this new weed becomes a problem.

Plant nutrition programs for mountain crops
Project 6558
An under-the-row pre-plant method of applying phosphorus fertilizer to Christmas trees was developed

and is being tested at two experiment stations and at nine on-farm locations in Western North Carolina. The method is still being tested, but increases in tree phosphorus content have been measured. If this method works as well as expected, it will drastically reduce phosphorus fertilizer applications to Christmas trees.

Cultural management of strawberries and grapes
Project 6324
Two workshops were organized on managing anthracnose fruit rot, a strawberry disease that is increasingly widespread and difficult to manage for North American strawberry nurseries and fruit growers. The workshops were videotaped and reproduced as a three-CD set. This educational program is designed to be especially useful to Cooperative Extension agents. The program assists agents in their general understanding of anthracnose fruit rot and points out the importance of tying together certification standards and micropropagation in an integrated approach to managing this pathogen in the nursery to achieve healthier plant supplies for growers.

Economic evaluation of technical change in cotton and peanut production
Project 5735
North Carolina State University faculty analyzed commodity buyout programs and the economic impact such programs are likely to have on farmers and rural communities. Information and consultation has been provided to the U.S. Department of Agriculture as well as farm groups and others interested in the impact of buyout programs.

Small fruit production systems
Project 6681
Faculty identified several viruses that are likely associated with the decline of some blackberry plantings in North Carolina. The North Carolina State University Micropropagation Unit has virus tested and established in tissue culture virus-indexed nuclear stock of most of the commonly grown varieties. The certification standards will enable North Carolina to become the only state in the Southeastern U.S. to have certified blackberry nurseries. This could enable North Carolina to become the leading supplier of clean blackberry nursery stock in the region.

Integrated peach disease management
Project 6160
Many peach cultivars are highly susceptible to a bacterial disease, bacterial spot, that can render the fruit unacceptable. Growers often wait to observe the disease before applying the limited chemicals available. The use of chemical sprays in this manner failed to provide adequate disease control. After analyzing weather data, researchers determined that in years when the disease was severe there were frequent periods of rainfall during bloom and in the following three to four weeks. Sprays containing copper were applied prior to and during this period. This research has defined the critical fruit infection period as occurring early in the growing season near time of bloom rather than continually until fruit have ripened, thus potentially reducing the number of sprays while reducing fruit lost to this disease. The management strategy developed from this research is the basis for chemical control of bacterial spot on peaches in the Eastern U.S.

Management of arthropods on fruits and vegetables and Western North Carolina
Project 6402

Identification of the sex pheromone of the dogwood borer, an increasingly important pest of apples, has led to the development of more effective monitoring techniques, which will enable scientists to study the biology and ecology of this pest. The sex pheromone also holds promise for management of borers through mating disruption or mass trapping programs. Testing of new management strategies is planned for the next growing season.

Crop improvement strategies
Project 6515
Two guides, a Pansy Production Handbook and Pansy Disorder Photocards, were developed to help greenhouse growers monitor their crops and prevent crop losses. These guides provide the latest information about production practices and provide an in-house diagnostic guide when problems occur.

Risk aversion, risk shifting and alternative payment mechanisms in settlement of broiler contracts
Project 6527
Virtually all broiler companies use incentives to compensate their contract growers. Changes in production technology designed to meet consumer demand require that compensation mechanisms be updated or entirely redesigned. When a North Carolina company found that its existing payment scheme did not provide correct incentives to growers producing heavier birds, the company asked for help from North Carolina State University in redesigning their broiler production contract payment mechanism. After discussing the issue with division managers and carefully reviewing the production data, an NC State faculty member provided several alternatives to the existing payment mechanism.

Economic decision support for sustainable ag products
Project 6528
North Carolina State University economists used survey data from USDA-NASS to compare the technical, environmental and cost efficiency of pesticide use in conventional and transgenic cotton production. Substantial heterogeneity was found in technical and environmental performance and in costs among the cotton growers in the sample. The environmental efficiency of stacked gene cotton growers was significantly better when compared with growers of herbicide-tolerant and conventional cotton, respectively. In contrast, no statistically significant differences were found for pest control cost. The follow-up regression analysis related the efficiency scores to grower attributes, field attributes, bio-physical production environment and to cotton seed type. The regression results confirmed the importance of stacked gene cotton for improving the environmental efficiency of pesticide use in cotton. In contrast, seed type was not significant in explaining differences in cost efficiency among North Carolina cotton growers.

Use of alternative supplements in grazed, hayed and ensiled forage systems for beef cattle
Project 6736
The North Carolina Cooperative Extension ruminant nutrition program works both directly with producers and through extension agents to enhance and expand the use of byproducts in feeding programs. In 2004, more than 3,000 tons of recycled poultry bedding, 7,000 tons of soybean hulls, 4,500 tons of dry corn gluten feed and 8,000 tons of wet corn gluten feed, and 5,000 tons of other miscellaneous byproducts were used by clients for a realized savings of more than $1 million.

Nutritional strategies to improve the growth, productivity and profitability of dairy cattle
Project 6605

Feeding calfs a high protein milk replacer and calf starter combination to accelerate growth is being evaluated. Preliminary results indicate an increase in average daily gain of about 1/3 pound per day through the first 84 days of life using this higher protein milk replacer program. Improving growth in calves can reduce the time to first breeding and thus reduce the age at first calving.

Improving reproduction and management of dairy cattle
Project 6600
Dairy grazing studies at North Carolina State University have demonstrated that although pasture-based dairy production may result in less milk per cow, there are enough efficiencies gained otherwise to be economically competitive with confinement feeding systems. Although improved grazing systems are used on a small percentage of farms, there is increasing interest in the use of pasture as a basis for entry into organic production. There have been a number of inquiries about the possibility of organic dairy production in North Carolina, and a group of specialists and others is working to provide objective information for producers considering this option.

Mycotoxins and their effects on dairy cattle
Project 6348
Ration formulation using alternative feeds and based on feed analysis has increased annual dairy farm profits by $100 per cow. More than 80 percent of North Carolina dairy producers are using these feeding recommendations. Dairy producers have adopted measures to prevent mycotoxin contamination of feed and have learned to prevent and to recognize and treat problems. These adopted feed practices are estimated to have increased annual dairy farm profits by $10 million. They have also improved the safety and quality of North Carolina produced dairy products.

Genetic improvement in pork production systems and understanding genotype by environmental interaction
Project 6496
The Pork Information Gateway (PIG) was organized and an editorial board of 16 members from 10 states appointed in 2004. PIG is a nationwide, refereed source of information for America's pork producers being created by swine educators and the National Pork Board. PIG consists of electronic publications housed in three centers: a Resource Center (factsheets and educational materials), an Answer Center (frequently asked questions) and a Learning Center (distance learning and certification). The Pork Information Gateway will have an enormous impact on how information is delivered and technology is transferred to America's pork producers when it is released in 2005.

Nutrient requirements of swine for profitable production
Project 6495
Studies determined the effect of removing fiber fractions from corn through processing (dehulled, degermed corn) on pig performance and excretion of nutrients. The effect on performance of nursery pigs, growing-finishing pigs and sows was minimal when fiber was reduced, and improvements in feed efficiency were observed. Nutrient excretion was drastically reduced in pigs fed processed corn products. Through nutritional strategies, a reduction of 20 to 50 percent in excretion of nitrogen, phosphorus and micro-minerals could be achieved at a cost that is likely to be less than the cost of handling manure after excretion.

Maximization of laying hen performance, economic return and egg quality
Project 6184

As part of the North Carolina Layer Performance and Management Test, faculty examined alternative molting programs for their effectiveness as related to the industry standard program of fasting. Another goal is to understand the fast as a component of the molt program. These experiments included a survey of the microbial shedding of laying hens subjected to alternative molting programs. Test reports are sent to all North Carolina producers, while an additional 315 reports are sent to producers and industry representatives throughout the United States and in16 other countries. The primary breeders and egg companies use the test in increasing intensity to compare and evaluate strains and the different environments that are imposed upon them.

Fish food ingredients produced by solubilization/reprecipitation
Project 6616
Considerable quantities of edible meat from trimmings and deboned carcasses of meat, poultry and fish are wasted, and many smaller pelagic fish species are underused for food, being converted primarily to fish meal for animal feed. Two important processes were developed to address this challenge. A new method of recovering and refining such meats, which removes fat, connective tissues (including skin) and bone, was developed and is being commercially scaled. And a method of solubilizing and injecting this meat protein into intact fillets and cuts of meats, poultry and seafood was developed. In tandem these technologies enhance the texture and taste of meat, poultry and fish products while reducing the cost to consumers. The new meat recovery method also reduces treatable effluent from meat, poultry and seafood processing factories.

Mountain aquaculture research
Project 6153
In 2004 and continuing into 2005, extension collaborators in North Carolina, Idaho and West Virginia set up yield verification trials with 10 cohorts or lots of trout on trout farms in those states. During the trials, fish production parameters of interest such as mortality rates, feed rates and sizes, feed conversion, stocking densities and water quality measures were gathered by the producers and confirmed by the extension collaborators. Each group of fish was tracked from stocking until final harvest. The Extension collaborators reported back to the producers on the current status of the fish and how they were performing relative to other locations. When unexpected values were discovered, such as a sudden rise in feed conversion, corrective recommendations were provided. On two farms, rapid adjustments were made to the feeding rate and to the feed size used. In both instances, these adjustments helped prevent production losses. Researchers from North Carolina State University, the University of Idaho and the University of Arkansas - Pine Bluff also surveyed well-defined segments of the trout industry in North Carolina and Idaho to gather detailed and accurate economic information regarding production costs and the cost/benefits of implementing additional requirements for effluent treatment. The economic models developed were provided to EPA for use in determining appropriate guidelines and possible new regulations for the trout industry. On an individual farm level, cooperating facilities saved thousands of dollars in potentially lost revenues after adopting the practices recommended by the Extension collaborators. The Extension collaborators verified the improved production efficiency resulting from their recommendations, as well as strengthening ties with the producers.

Strategies to increase meat goat production
Project 6701
North Carolina State University faculty members played an integral role in the organization of the North Carolina Meat Goat Producers Coop and continue to work with the organization. As a result, 660 farm families from 65 counties and four states are now certified members of the cooperative. Training sessions

were held to certify 38 North Carolina Cooperative Extension agents interested in working with district affiliates of the cooperative. The coop holds an annual meeting every March, organizes an annual farm tour, and publishes a monthly educational newsletter. Brochures advertising the coop and goat meat recipes have been developed for distribution to the general public, restaurants and at two welcome centers on I-95. A coop website was developed, and goat meat can be ordered on-line. The coop also works with three slaughtering/processing plants.

Integrating crops and livestock systems
Project 6602
Sustainable agriculture programs are identifying opportunities for niche marketing such as direct marketing (green labels, farmers markets and community-supported agriculture) and organic production. Meat goat production research is a project that combines controlled grazing technologies with alternative enterprise development. The creation of a meat goat-marketing cooperative in North Carolina is a concrete example of sustainable agriculture program impact.

Price risk management strategies in food and grains marketing
Project 6510
The North Carolina Grain Growers Cooperative proposed the development of a large biodiesel plant to be located in Mount Olive, NC. This plant will demand a significant amount of soybean oil and in turn have a positive impact on crush margins and soybean basis in the surrounding area. This project has enormous potential, but there are many complicating economic factors at play. North Carolina State University faculty researched and evaluated the economic feasibility of proposals developed by consultants. After careful analysis and several presentations, talking points involving critical economic factors that need further consideration were developed. These talking points were shared and discussed with major stakeholders at several meetings. The analysis helped shaped further investigation into the project. Based on this further analysis, the proposal recently received a significant amount of funding and an equity drive to secure the remaining funds to move forward is underway.

Economics of adoption of agricultural technologies
Project 6610
Multiple studies and publications have been produced such as: "Southern cotton farmers' perceptions of environmental benefits from precision agriculture;" "The role of public goods characteristics in the adoption of a new biotechnology: The case of corn rootworm-resistant corn;" "The Net Benefits, Including Convenience, of Roundup Ready® Soybeans: Results from a National Survey;" "Factors Affecting Southern Cotton Farmer Adoption of Precision Technology Sooner than Later;" "Measuring Differences in Pesticide Use from GM Crop Adoption;" "Non-Pecuniary Benefits from Roundup Ready Soybean Adoption;" "Sources of Funding for New Swine Waste Management Technologies in North Carolina;' and collaborated with Ag Engineering to calculate the economic return from sub-surface drip irrigation.

GOAL 2 **A SAFE AND SECURE FOOD AND FIBER SYSTEM**

Enhancing food safety through control of foodbourne disease	**0295**

agents	
Improvement of thermal processes for foods; aseptic processing and packaging studies.	**0836 5661**
The poultry food system: A farm-to-table model	**0292**

Enhancing food safety through control of foodborne disease agents
Project 0295

Poor sanitation programs can costs a large food processors $250,000 to $500,000 per year in water consumption, wastewater treatment, and lower product quality. A 3-credit, computer based food sanitation course (FS 495K) has been developed for industry and on-campus students. Over the past three years over 50 industry persons have taken the course, and Tyson Foods has incorporated this course into their management training program. In 2004, 20 industry persons were trained in food sanitation practices from large meat processing plants. Their estimated cost savings from improved sanitation programs would be $5 to $10 million dollars.

Improvement of thermal processes for foods; aseptic processing and packaging studies
Projects 0836, 5661

The first pilot-plant scale installation (60 kW) of a focused continuous flow microwave system for thermal processing of foods and biomaterials was completed. This system has been integrated with existing aseptic processing and packaging equipment and tested in the Center for Aseptic Processing and Packaging pilot plant. Four faculty programs are taking advantage of this unique facility.

The poultry food system: A farm-to-table model
Project 0292

Research indicates that *Salmonella* species populations and their prevalence on commercial broiler farms were not impacted by individual farm, season or flock age, but collectively, they did influence *Salmonella* populations. While this research did not relate the observed poultry litter properties to *Salmonella* populations, the litter populations on some farms were significantly impacted by season and flock age. Based on data obtained from grower management surveys, it appears that rearing birds on newer litter and not using litter treatment products may contribute to higher *Salmonella* litter and fecal populations. Efforts to determine the incidence and quantify pre-harvest *Salmonella* populations, such as described in this study, can aid in the development and testing of new and effective on-farm pathogen control strategies. These on-farm control strategies will ultimately lead to a reduction in the flock contamination level entering the processing plant.

GOAL 3
A HEALTHY, WELL-NOURISHED POPULATION

Biology and control of nuisance vector arthropods in NC	**6752**
Insect and manure management in poultry systems: elements relative to food safety and nuisance issues	**1006**

Biology and control of nuisance vector arthropods in North Carolina
Project 6752
Bacterial species that produce metabolites that mediate the oviposition responses of the disease vectors *Aedes aegypti* and *Aedes albopictus* are being identified. Researchers previously established that gravid females use volatile metabolites produced by the bacterial community in mosquito habitats as semiochemical cues to locate containers for egg laying. Researchers have captured volatile chemicals from these bacteria that mediate mosquito oviposition. These odorants are being identified by GC/MS. Once they are identified, the chemicals will be formulated into a lure that can be used to increase the effectiveness of traps used for surveillance or control of container-inhabiting mosquitoes.

Insect and manure management in poultry systems: elements relative to food safety and nuisance issues
Project 1006
Research has focused on fly transmission of *Salmonella* and Newcastle disease virus. A unique trapping system to collect flies for pathogen monitoring was used to demonstrate that house flies are capable of harboring Newcastle disease virus beyond 96 hours. The risks for the poultry industry relative to the practice of mixing insecticides and disinfectants to control poultry pests and sanitize poultry houses were identified. Such practices reduced the efficacy of many commonly used chemicals. Results of this study clearly demonstrate the implications for the spread of pathogenic agents.

GOAL 4
AN AGRICULTURAL SYSTEM WHICH PROTECTS NATURAL RESOURCES AND THE ENVIRONMENT

Environmental nursery crop production	**6224**
Evaluation and modeling of riparian buffer performance in the Neuse River Basin	**6609**
Precision agriculture for agronomic crops and nitrogen management for corn in Eastern North Carolina	**6652**
Evaluation of tillage practices, organic production, and trickle fertigation for nutrient management	**6648**
Nutrient and by-product utilization and health of turkeys and broilers	**6343**
Effect of management on turkey production, turkey reproduction and turkey waste handling	**6390**
Improved efficiency of water reuse aquaculture systems	**3975**
Bioavailability, transport and fate of contaminants in aquatic eco systems	**6509**
Community-wide impacts and management of Septic Systems	**6372**
Animal manure and waste utilization, treatment and nuisance avoidance	**1000**

Environmentally compatible nursery crop production practices
Project 6224
Pine bark and sand are the most commonly used ingredients to grow nursery crops in containers in the Eastern United States; however, these substrate components offer little water or nutrient retention. Research showed that a clay amended pine bark substrate engineered to retain water and fertilizers can also increase growth and provide an alternative Best Management Practice without costly infrastructure changes.

Evaluation and modeling of riparian buffer performance in the Neuse River Basin
Project 6609
North Carolina Cooperative Extension faculty worked with local landowners to develop nutrient management plans for nearly 25,000 acres and installed more than 100 water control structures to implement controlled drainage on approximately 5,000 acres in the Core Creek Watershed. The hydrology and surface water quality associated with these best management practices were monitored throughout the watershed. Outflow was measured continuously and drainage grab samples were collected monthly and analyzed for nutrients such as nitrogen and phosphorus. The data were used to calibrate the water table management hydrology and nutrient model, DRAINMOD-N. DRAINMOD-N was then used to simulate the long-term water quality benefits of nutrient management and controlled drainage. Based on long-term simulation analysis, predicted nitrate-nitrogen reduction was most effectively accomplished when controlled drainage and a nitrate management plan were used in conjunction with one another. If implemented separately, a nitrate management plan was predicted to be about 50 percent more effective than controlled drainage alone. The cropping system also impacted the drainage rate and nitrate loss from the fields.

Precision agriculture for agronomic crops and nitrogen management for corn in Eastern North Carolina
Project 6652
Guidelines for soil fertility management are under development in support of kenaf and organic grain production systems. Statewide, kenaf acreage increased to approximately 5,000 acres in 2004. Transitional organic grain acreage increased to 50 acres in Hyde County and is expected to increase as a planned poultry layer operation provides a locally abundant organic fertility amendment.

Evaluation of tillage practices, organic production, and trickle fertigation for nutrient management
Project 6648
Cnservation tillage systems were developed that reduce or eliminate water and soil runoff from farm fields. A majority of farmers across Western NC have adopted these conservation tillage practices for corn production. Farmers have also started to use these methods for growing tobacco and vegetables.

Nutrient and by-product utilization and health of turkeys and broilers
Project 6343
Appropriate dietary supplementation of enzymes, amino acids and organic minerals to poultry feed reduced emissions of phosphorus, nitrogen and other minerals by improving diet digestibility by more than 5 percent. Dietary supplementation of novel enzymes, oligosaccharides, probiotics and immunoglobulins was found to stabilize gut microflora, discourage enteric pathogen colonization and improve enteric health. More than 70 percent of poultry feed now includes supplemental enzymes to improve nutrient utilization, resulting in a 5-10

percent reduction in phosphorus and nitrogen emissions, better nutrient utilization and improved enteric health. The use of enzymes and feed additives reduces feed costs by at least $.40 per ton, resulting in a savings of over $2 million to the poultry industry.

Effect of management on turkey production, turkey reproduction and turkey waste handling
Project 6390
The growth performance and fecal phosphorus excretion of turkey poults fed diets containing genetically modified low-phytate and normal soybean meal were compared. The feeding trail showed that the low-phytate soybean meal diet produced bird performance equal to that of the normal soybean diet, while the low-phytate diet reduced fecal phosphorus.

Improved efficiency of water reuse aquaculture systems
Project 3975
Research suggested that dissolved inorganic nitrogen can be effectively removed from the effluent stream from intensive fish production systems. This simple technology utilizes wood chips as a media on which to grow naturally occurring bacteria to break down potentially harmful nitrate in the water to harmless nitrogen gas.

Bioavailability, transport and fate of contaminants in aquatic ecosystems
Project 6509
The common carp, Cyprinus carpio, was used as a biomarker to evaluate the presence of estrogenic chemicals in Falls Lake, the drinking water supply reservoir for Raleigh, North Carolina. Mean plasma vitellogenin concentrations in Falls Lake carp were consistent with concentrations expected in normal, sexually mature male and female fish of the species, indicating that the carp and by extension, the people of Raleigh, had not been exposed to estrogenic chemicals.

Community-wide impacts and management of septic systems
Project 6372
A pilot study was conducted with the Wake County, North Carolina Department of Environmental Services to determine how well septic systems are functioning. Study results indicated that the vast majority of systems (90 percent) were operating well; however, the failure rate observed (8-10 percent) was agreed to be too high. The study identified specific operating and maintenance factors that had significant effects on system failure rates along with factors that did not influence failure rates. Based on this study, the Wake County Department of Environmental Services has identified 10 important lessons learned and is developing recommendations to address these issues.

Animal manure and waste utilization, treatment and nuisance avoidance
Project 1000
A substantial portion (estimated at 40-60%) of manure produced by swine is directly related to the fiber content of the diet fed. Removing this fiber prior to feeding may reduce nitrogen and organic waste production. Corn was processed to remove hulls and germ, both high-fiber components, leaving the endosperm as a feed ingredient for pigs. Feeding pigs, degermed, dehulled corn reduced waste production by approximately 40% while possibly reducing odor emission without negative effects on animal performance. Degermed, dehulled corn has the potential to reduce manure production substantially without negative effects on animal performance.

GOAL 5
ENHANCED ECONOMIC OPPORTUNITY AND QUALITY OF LIFE FOR AMERICANS

Implications of technological and social changes for the food system	**6465**
Economics of socially optimal pork production	**6706**

Implications of technological and social changes for the food system
Project 6465
Researchers analyzed consumer acceptance and behavior related to biotechnology over time and across many countries. At the same time, a range of stakeholder groups from leading academic, business and government organizations were polled on biotechnology issues. These efforts provided insight that has aided in the development and regulation of agricultural biotechnology and improved private and public sector decision making related to biotechnology.

Economics of socially optimal pork production
Project 6706
Anticipated changes in livestock feeding, housing and manure management in concert with dramatic changes in global meat demand and the global structure of farming require new economic insight. Contributions of informed economic analysis and perspective at the farm, market, region, national and global level will be critical in the implementation of efficient policy and livestock production systems. Research is broadening the economic scope of agriculture and silviculture to include production of energy, fertilizer, other non-food and non-fiber products, aesthetic and environmental services, as well as a safe use for otherwise wasted water, energy, nutrients and other by-products of human activities.

Integrated Summary:

Integrated Extension-Research Projects reported: 55

Smith Lever B & C funding Planned: $1,819,423 ($309,398 over plan)

Total Smith Lever B & C funding allocated to the 55 projects for FY 2004: $2,128,837

U.S. Department of Agriculture
Cooperative State Research, Education, and Extension Service
Supplement to the 5-Year Plan of Work
Multistate Extension Activities and Integrated Activities
(Attach Brief Summaries)

Institution N.C. Cooperative Extension Service
State North Carolina

Check one: __ Multistate Extension Activities
___ Integrated Activities (Hatch Act Funds)
_X_ Integrated Activities (Smith-Lever Act Funds)

Title of Planned Program/Activity	Actual Expenditures FY 2000	FY 2001	FY 2002	FY 2003	FY 2004
Goal 1. A highly competitive Agricultural System	337,491	456,627	1,131,749	1,405,681	1,554,963
Goal 2. A safe and secure food and fiber system	30,893	98,804	100,795	93,558	93,613
Goal 3. A healthy, well-nourished population	0	0	0	0	54,302
Goal 4. An Agricultural system protecting natural resources and the environment	382,620	328,702	432,398	508,130	370,865
Goal 5. Enhanced economic opportunity of quality of life	81,456	79,605	55,222	44,646	55,094

Total	**$832,460**	**$963,738**	**$1,720,164**	**$2,052,015**	**$2,128,837**

Signed by
Jon F. Ort **3- 22 -05**

3/22/05
Director **Date**

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