NORTH CAROLINA

COOPERATIVE EXTENSION

AREERA

Annual Report of Accomplishments and Results

Agricultural Research, Extension and Education Reform Act of 1998

2005

(submitted March, 2006)

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

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

Report: 2005 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 update submitted for 2005-2006

CONTENTS page

Introduction 2-3

A. Planned Programs

- **National Goal 1**: An Agricultural System that is Highly Competitive in the Global Economy 3-10
- **National Goal 2**: A Safe and Secure Food and Fiber System 10-16
- **National Goal 3**: A Healthy, Well-Nourished Population 16-20
- **National Goal 4**: An Agricultural System that Protects Natural Resources and the Environment 20-25
- **National Goal 5**: Enhanced Economic Opportunity and Quality of Life for Americans 25-31

B. Stakeholder Input Process 32-33

C. Program Review Process 33-34

D. Evaluation of the Success of Multistate and Integrated Activities 34-35

E. Multistate Extension Activities 35-44

F. Integrated Research and Extension Programs 44-60

- **Multistate and Integrated Programs Financial Certification** 61

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 2005 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 continues to be the reality faced by the US agriculture sector. The buy-out of tobacco farmers is proceeding and farmers face significant choices in their enterprise mix. Other enterprises are following on the trail of the tobacco marketing system. Contracting seems to be the mode of commercial commodity marketing. The livestock sector continues to face uncertainty with continued concern over BSE impacting trade, though customers in the US seem to be taking it all in, in stride. Avian flu is the next pending crisis. Feed prices have been holding due to good supplies. Energy cost spikes have had major impacts on profitability though it too may have a "good" side; stimulating interest in bio-fuels again.

Extension programs sought to assist livestock producers through improvement in production management and the adoption of new marketing and risk management strategies for beef and other traditional commodities. Organic milk production is being explored seriously and Extension has taken a leadership role in the discussion. Additional livestock marketing efforts included local marketing system and the development of niche and other specialty approaches. New and value added livestock enterprises increased in importance as NC producers sought to exploit the markets that the media interest has stimulated. These included pork and other 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 prepare response plans to cope with the new foreign animal diseases and bio-terrorism threats, most recently through progress on premises identification. The NAIS program is beginning to gain visibility here in the state. Recent work has

analyzed waste management options for hog systems as this sector continues to face significant environmental regulations, training, licensing and reporting requirements. In addition. NC Extension has developed a website with information pertaining to the avian flu threat and steps that will be needed to be taken if we are faced with a crisis.

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 and North Carolina A&T State University continue to partner to develop and demonstrate new aquaculture technology and the commercialization of new species of food fish. Work on feed management for hybrid striped bass producers has led to improved feeding efficiency and reduced nutrient loading, providing economic and environmental benefits. Additional programs focused on creating value-added products. New value-added products developed include smoked trout pate, 12 trout stuffings, chilled salads, dips, smoked fish and pasteurized crab meat. 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 for SSOP and HACCP process management. Work on safe food handling issues has lead to improved methods for the control of spoilage bacteria for increased food safety and shelf life. NC Cooperative Extension is working with a value-added facility in Western North Carolina to insure safe food handling in the production of smoked trout.

The end of the tobacco program with its system of quotas and the low and variable profits for many traditional enterprises due to significant supply across the world market creates broad interest in alternative farm enterprises. Specialty crops are important segment of North Carolina's agriculture. Nursery, greenhouse and vegetable crops contribute over $1.10 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. Management of production in response to market demand is central. 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 NCA&TSU responded to these and other issues with a broad array of extension programs. Livestock generate 65% of North Carolina's gross farm income. Fears of 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- $7,169,815

NCCES FTEs -State 42	County - 62	Program cost- $6,787,685
NC A & T FTEs - State 2.75	County - 4.5	Program cost- $382,130

KEY THEME: Agricultural Profitability

a. Issue: 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 224 dairy producers, 5,326 beef cattle producers, 1,579 hog producers, 3,134 horse producers, 3,399 sheep and goat producers, and 481 poultry producers. 14,043 producers adopted best management practices that optimized income, including 124 dairy producers, 5,326 beef cattle producers, 1,579 hog producers, 3,134 horse producers, 3,369 sheep and goat producers, 481 poultry producers, and 33 producers of aquatic species.
The total impact of these activities was estimated to be $12,006,063.

c. State Specific

KEY THEME: Agricultural Profitability

a. Row crop farmers will 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: 2,075 crop producers adopted approaches improved labor management to ensure continued farm productivity and profits and quality of life, including 98 cotton producers, 262 grain producers, 82 peanut producers, 1,224 tobacco producers and 409 soybean producers.

39,109 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 2,703,072 acres of crops. Increased profits through the adoption of new marketing and risk management strategies, business planning and labor management involved 5,504 producer contacts and impacted 898,076 acres. The financial impact generated by all of these accomplishments is estimated to be $49,738,945.

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 4,275 individual approaches to ensure continued productivity and profits and quality of life, including 1,384 by fruit growers and 2,891 by vegetable producers. 4,025 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 59,815acres. Increased profits through the adoption of new marketing and risk management strategies, business planning, and labor management involved 901 producer contacts and impacted 13,422 acres. The financial impact generated by all of these accomplishments is estimated to be $7,361,000.

c. State Specific

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 122 producers and 33 producers adopted best management practices that optimized income. The total impact of these activities was estimated to be $2,962,290.

c. State Specific

KEY THEME: Small Farm Viability

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 NCA&TSU responded to these and other issues with a broad array of extension programs. Interest in alternative enterprises is strong and marketing is the critical question before sound 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, agro-tourism and support for local farms has grown, 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 9,108 alternative production, marketing and business practices. These practices impacted 93,686 acres and generated an additional $5,134,988 for these producers. Farmers markets are being incorporated in urban fringe subdivision developments in Wake and Chatham Counties. 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 $1.9 million in increased income. Presence of producers in multiple markets saw revenues also increase by $1.8 million.

c. State Specific

Key Theme: Adding Value to New and Old Agricultural Products

a. Issue: To increase the profitability and ability of North Carolina tree fruit growers to compete in a global market it is necessary to increase fruit quality, achieve consistent annual production, maximize productivity and reduce inputs and add value. In addition, NC growers must diversify their markets to remain competitive and profitable as well as producing value-added products. Research conducted by NCARS scientists over the past 4 years has evaluated strategies and products to control browning for fresh sliced apple industries. In addition, research has been conducted to address major horticultural issues limiting tree fruit production in the Southeast.

b. Impact: Through educational programs and direct assistance provided by Cooperative Extension specialists and agents, a new commercial business was launched in Henderson County, with the ground breaking for construction of a $ 2.5 million state-of-the art apple slicing facility. This business will actually begin operation in May 2006 and will add approximately 20 new employees. This plant will provide apple slices for the retail market, one of the fastest growing fruit markets nationally. The economic benefit to the apple growers, processor and citizens of Henderson County will be significant from the number of new jobs created as well as economic input into the local economy. In addition, the increase in consumption of fresh apples, high in antioxidant anti-cancer properties, will benefit the entire Southeast with healthier diet choices in a snack food package.

c. Scope of Impact: State and regional

Key Theme: Diversified/Alternative Agriculture

a. Issue: A long-term dairy grazing study at NCSU conducted in the 1990's resulted in a series of refereed publications and numerous articles in popular press and conference proceedings. Those results demonstrated that although pasture-based dairy production may result in less milk per cow that there were enough efficiencies gained otherwise to be economically competitive with confinement feeding systems. Producers have inquired about ways to reduce costs or to add value to their farm enterprises by on-farm processing, or possibly converting to organic production. Current work with pasture-based dairy research at the Center for Environmental Farming Systems is adding additional knowledge to the opportunities for pasture-based dairying in North Carolina including information on use of crossbred dairy cattle in such production systems.

b. Impact: Although improved grazing systems are used on a small percentage of farms, there is increasing interest in 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 are working to provide objective information for producers considering that option. A national dairy cooperative, Organic Valley, has offered support to help interested dairy producers to transition into organic production. Several dairy producers are now considering organic dairy production as an option. In the past several years there have been 14 dairy farms that have been assisted by Extension as they developed plans for on-farm processing of fluid milk and ice cream or production of fresh and aged cheeses in North Carolina.

c. Scope of impact: State specific

KEY THEME: Animal Health

a. Issue: 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 was 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.

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: Farm Management

a. Issue: Computer illiteracy, low levels of education, lack of managerial ability, and lack of electronic buying and marketing skills to be competitive are all issues that reduced some of North Carolina small farmers' ability to obtain loans and legal settlements. Surveys and field observations revealed "that farmers had poor record keeping/filing systems and kept receipts and records on the dashboards of trucks, under truck seats, shoeboxes, paper bags, etc." As a result of economic hardships some farm families are forced to seek off-farm employment to sustain farming operations whereby some jobs required some level of computer literacy and technology skills. The Farmers Adopting Computer Training (FACT) Project has assisted small farmers to eliminate some of their problems concerning poor record keeping and farm management practices by identifying resources and providing computer training. In 2005, approximately 150 small farmers (65 males and 85 females) received five-week courses of over 18,000 instructional tuition-waived training hours in Keyboarding, Microsoft Word, Internet and Excel combined. Before enrolling in the FACT Program, small limited-resource farmers were skeptical, nervous and felt like computer training was too hard to imagine.

b. Impacts: Since completing the trainings, their confidence level has increased, attitudes changed and fears eroded. Some have received promotions from off-farm jobs that supplemented their farm income and have gained a brand new avenue of experience and skills that they apply to many areas of everyday living. They are transacting business (buying supplies and selling produce) on the Internet instead of driving to the nearest supply store or market; keeping track of farm inventory, acreages and processing spreadsheets Small farmers are also communicating with other farmers and friends via email about crops, advertising produce, making business cards, researching and/or accessing farm information to keep abreast of farming trends from governmental and non-governmental agencies in order to stay competitive and make a profit. They attended computer training sessions at eight community college campuses across the state of North Carolina. It is estimated that participants saved over $60,000 towards improving their standard of living by enrolling in the FACT literacy and technology courses.

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

Despite the fact that our food supply is considered 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 annually with costs estimates from lost productivity even higher. To reduce these health risks and associated costs, consumers 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 conduct broad-based applied research studies and 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 2004-2006 Plan of Work for Goal 2 – A Safe and Secure Food and Fiber System includes several related 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. Therefore, the activities and impacts described in this section are very diverse.

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- $4,228,543

Key Theme: Food Safety

a. Issue: North Carolina is the second largest trout-producing state in the US. North Carolina trout farmers as well as trout farmers across the country produce a wholesome and safe product, but consumers are constantly bombarded with conflicting information regarding seafood safety, resulting in difficulty making

wise and healthy choices regarding fish consumption. The correlation between fish consumption and mercury is one example of conflicting information that could result in consumers avoiding seafood in spite of clearly demonstrated health benefits obtained from eating fish. Farmed fish, and farmed trout in particular, have extremely low levels of any contaminants, but only limited information is available relative to mercury content in these products.

Beginning in 2005, an Aquaculture Specialist at NCSU designed and coordinated an effort to obtain samples of farm-raised rainbow trout from commercial facilities in the primary trout production states across the US. The sampled trout were ready for market and were from 12 to 18 months of age. Information was also gathered about the feed sources, water supply, and proximity to any potential source of mercury discharge, such as waste sites or coal-burning industries. The trout samples were then analyzed for mercury content, using samples of edible muscle tissue only since methylmercury accumulates in those tissues rather than in fat, skin or internal organs. In every case, the mercury content of the farmed trout was orders of magnitude below the action limits set by FDA (1.0 ppm) or by EPA (0.3 ppm). Average mercury content in trout meat was 0.013 ppm with a range from <0.001 to 0.030 ppm in all samples, placing it among the very lowest in popular seafood species. There was no difference between locations or facilities, and all samples were actually below the legal reportable limit for the analytical method used (EPA Method 7470A; legal reportable limit 0.05 ppm).

b. Impact: When a processor or producer is asked, "how much mercury is in your fish", the answer cannot be "I don't know" or "we haven't checked" or the potential customer is lost. Public perception resulting from negative and conflicting reports on the safety of fish consumption relative to mercury content has resulted in a decline in consumption of some fish products, for example, a >10% drop in tuna consumption nationally. Trout producers now have additional evidence to document the safety of their product and avoid the costly impacts of consumer fears regarding mercury. The value of this information to the industry is difficult to assess, but the potential cost of lacking the information could be devastating.

c. Scope of Impact – National

Key Theme: Food Quality/Security

a. Issue: Sustaining animal production activities to provide a safe and secure meat industry in North Carolina remains a significant focus of several Extension specialists in Animal Science. A number of educational programs with food safety implications and specific to the beef, diary, and pork industries were developed in 2005.

b. Impact: **Beef** – An outdated beef quality assurance program was completely revised according to national standards as a means for improving the profitability of North Carolina beef producers and for development of alternative marketing opportunities. This program also educates beef producers on the requirement to follow strict withdrawal times on all agricultural chemical products used in production. Following the ban on using ruminant derived protein in animal feeds, an additional emphasis was placed on using approved feed ingredients known to be safe for humans. This strategy also included not feeding crops or crop residues treated with agro chemicals that are not approved for cattle consumption. **Dairy security** - Committee activities were focused on establishing procedures at the state and regional level that would minimize the impact of a foreign animal disease outbreak on the local supply of milk shipped to processors in the state and region. This effort evolved into the development of a business continuity plan to rapidly contain any foreign animal diseases and thus help producers stay in business. **Pork quality** – The faculty of the Departments of Animal Science and Food Science along with representatives from

Smithfield Packing Company developed and offered PORK 101 courses for Smithfield Foods employees. These two-day courses were held at the Smithfield training center and Smithfield Packing Plant located in Smithfield, VA. This course provided in-depth training on topics of quality, food safety, and consistency issues in the pork industry. A total of 321 Smithfield Food employees from four states completed the class. Participants ranged from new hires to corporate officers (Chief Information Officer). Participants gave an overall course evaluation rating of 4.61 (4= good and 5 = excellent).

KEY THEME: Food Security

a. Issue: Since its first isolation from a farmed goose in Guangdong Province, China in 1996, the highly pathogenic H5N1 Avian Influenza virus has been spreading, particularly over the last several months, throughout Asia, eastern Europe, and Africa. The transmission of this disease has been largely attributed to migratory waterfowl as they move to wintering areas. However, other means of transmitting this disease are highly likely. The H5N1 virus is capable of causing high mortality in waterfowl and poultry; and while there has been very limited research involving swine, the virus has been shown to kill pigs yet at a lower mortality rate than poultry. Though the virus has been infrequently transmitted to humans, the current mortality rate is reported to be in excess of 50%. Due to the rapid transmission rate of this disease among avian species and the general confusion over the true risks associated with this virus strain among the poultry and swine industries, growers, and the general public, it is incumbent upon North Carolina Cooperative Extension to provide current science-based educational materials to these target audiences. Presently, the only rational strategy to prevent large scale avian outbreaks and its associated adverse economic impact in North Carolina and the U.S. is through education and training of animal industry workers, "backyard" flock owners, members of the press and the general public. A team of North Carolina Cooperative Extension specialists and scientists from the NCSU Department of Poultry Science in cooperation with representatives from the North Carolina Department of Agriculture and Consumer Affairs and Department of Public Health teamed together to develop and begin delivering training materials in both English and Spanish to address the concerns surrounding Avian Influenza. Through a series of meetings and distribution of educational materials this program is targeting Extension educators, commercial and backyard poultry growers, integrated poultry companies, processing plant employees, farm workers, live-haul crews, the media and the general public.

b. Impact: The program is addressing the current situation, the potential risks for the respective target groups encountering the H5N1 avian influenza virus, what is being done to look for the virus, what to expect. While a major goal is to provide timely information that can be used to recognize problems and make sound decisions, considerable emphasis is on communicating the true risk and the continued safety of poultry and swine products. In preparation for a potential terrorist activity involving avian influenza, an emergency response exercise was also conducted. The exercise involved 8 counties and many agencies and poultry companies. The exercise was deemed a success by all parties involved yet several short comings were identified. Identifying potential problems was considered one of the more significant impacts of the exercise. The knowledge gained will be invaluable in the event of a "real" disaster.

c. Scope: National and State specific

KEY THEME: Food Safety

a. Issue: In what has historically been considered a waste product and environmental problem of the egg processing industry, egg shell membranes may one day be viewed as a value-added by-product for enhancing the safety of our food supply. In previous studies our extension and research group demonstrated that exposure of selected foodborne disease causing organisms including strains of

Salmonella, E. coli O157:H7, *Staphylococcus aureus,* and *Listeria monocytogenes* to egg shell membranes either killed the cells or significantly reduced their resistance to heating. The exact membrane components or mechanism of action of this antibacterial activity were largely unknown.

b. Impact: The investigators identified three egg shell membrane-bound proteins (β-N-acetylglucosaminidase, lysozyme and ovotransferrin) that work in concert to alter the normal functioning of bacterial cell membranes (i.e., *Salmonella, Staphylococcus, Listeria, E. coli*) resulting in a significant increase in their sensitivity to heat and other treatments. The future application of this value-added byproduct in food processing systems may lead to the processing of heat-sensitive foods at lower processing temperatures and for shorter times resulting in reduced process costs, improved process efficiency, less nutrient loss, and improved product safety, quality and functionality.

c. Scope: National

Key Theme: Food Quality

a. Issue: Scombrotoxic fish poisoning is one of the three leading seafood-borne diseases in the United States. Reducing the risk caused by consumption of temperature-abused fish requires intervention strategies from point of harvest through processing and distribution to point of sale and consumption. Time and temperature are the primary measures used to control formation of biogenic amines in susceptible fish species responsible for the disease. But high hydrostatic pressure treatment is another measure being evaluated for the control of toxigenic histamine-producing bacteria and scombrotoxin formation.

b. Impact: Proper chilling of fish on-board the boat was studied to determine the prevalence and type of spoilage bacteria capable of producing histamine. This information was compiled and incorporated into model seafood safety plans for use by commercial and recreational fish harvesters. The information along with current regulatory guidelines was posted at http//:www.iceyourfish.seagrant.org. In addition, workshops were made available through the various cooperative extension and sea grant offices. Currently, work is underway to determine the effects of high hydrostatic pressure treatment on bacteria and enzymes responsible for histamine formation. The use of proper time and temperature controls and application of pressure processing is likely to reduce or eliminate the risks to acceptable levels in fish products. Rapid cooling fish on-board harvest vessels and maintaining good temperature control in the cold-chain can reduce the risk of food-borne illness. Processing properly chilled fish using hydrostatic pressure will further reduce the risks to acceptable levels. Adopting proper control measures to ensure a safe product will require a continuing education effort. These studies lay the groundwork for extension education programs and further applied research studies into other intervention strategies.

c. Scope: National

KEY THEME: HACCP

a. Issue: Food Science Extension specialists work in many roles to provide food safety programming to the industry. Specialists work primarily in the commodity areas of seafood processing, meats processing, dairy processing and produce processing. Their emphasis is on industry development and sustainability. Clientele involve management and technical personnel in the industry, assistance to entrepreneurs and advising regulatory personnel and decision makers. Much of the work is encompassed in training activities such as short courses and workshops, while other work is in applied research projects and

problem-solving. Recent efforts have been expanded to take advantage of the opportunities offered by distance education. Additionally, an emphasis has also been placed on food defense within the state and nationwide.

b. Impact: NCSU meat processing specialists conducted a HACCP Round Table forum which served to bring meat packers from North Carolina and USDA-Food Safety and Inspection Service personnel together in a question and answer format. The goal was to allow packers to seek rule interpretation and direction from the government agency that regulated their industry. Twenty-two people composed of many of the companies HACCP team leaders attended these semiannual meetings. A second innovative food safety workshop entitled: Sanidad el la Industria de la Carne (Basic Sanitation and Food Safety for the Meat Industry) was offered. With a significant percentage of food processing employees being of Hispanic background, the workshop was conducted entirely in Spanish and addressed the various issues surrounding proper employee hygiene, good manufacturing practices, basic food microbiology, and basic concepts of meat science. Since 1997 Extension personnel at the NCSU Seafood Laboratory have conducted 24 seafood processing workshops reaching 672 industry, regulatory and education personnel. The US Food and Drug Administration who grants certificates to the participants officially recognize this non-degree certificate course on food safety and processing. Presently, one of the Extension specialists is serving on the Steering Committee for the National Seafood HACCP Alliance that oversees the curriculum and administration of the seafood HACCP training program.

c. Scope: State Specific and Regional

KEY THEME: Food Safety

a. Issue: While the U.S. food supply is one of the safest in the world, each year 76 million Americans are still stricken with foodborne illness, and some — mostly the very young, older adults, 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. Foodborne illness is nearly 100% preventable if safe handling practices are applied from the time food is received until the time it is eaten. Education is one way to help food handlers understand what safe food handling practices need to be applied. The Family and Consumer Sciences Program of the North Carolina Cooperative Extension Service is one of the key sources of food safety information for consumers and foodservice workers.

b. Impact: A survey by the University of Georgia on home canning practices revealed that greater adoption of science-based home canning techniques is still needed. While only a portion of North Carolinians can foods at home, those who do need reliable information on safe food preparation and storage to prevent getting botulism. Extension Agents actively educate consumers about safe preservation methods. In fact, most are the primary (or only) source of science-based home food preservation information in their counties. They provide a wide range of educational services -- from testing dial-gauge pressure canners to answering individual questions about food preservation to delivering workshops. Extension Agents also educate consumers about how to safely purchase, store, and prepare meals. A four-lesson curriculum "For Your Health, Food Safety Begins at Home" has been widely used to help consumers better understand their risk for foodborne illness and to learn about what safe food handling practices need to be applied. This curriculum is based on the National Food Safety Education campaign, Fight BAC! During 2005 Extension agents reported delivering this curriculum to over 12,000 North Carolinians. Of those who attended sessions, nearly 2,800 reported adopting safe food handling practices. Educating children about safe food handling practices is also important. The Smart Kids, Fight BAC! curriculum developed by the University of Georgia in partnership with NCSU and Mississippi State

University was also used widely by Extension Agents. Results showed that 2,653 youth who participated in training increased their knowledge about safe food handling and 1,682 reported adopting at least one safe food handling practice.

c. Scope: State Specific

KEY THEME: Food Handling

a. Issue: Americans are eating more of their meals away from home. The typical person spends nearly half (47%) of their food dollars eating out. As more Americans eat out, more responsibility for food safety lies with the foodservice industry. In North Carolina, there are nearly 27,000 foodservice establishments employing nearly a quarter million people, making it the second largest private sector employer in the state. The challenges faced by this industry include high turnover, language and literacy barriers, and limited resources for on-site food safety training. The National Restaurant Association estimates it would cost a restaurant about $75,000 if they were implicated in a foodborne illness outbreak. Therefore, educating foodservice operators about safe food handling is not only essential for protecting public health but also for protecting the economic well-being of the foodservice industry in North Carolina.

b. Impact: Agents deliver training to a variety of foodservice audiences – foodservice managers seeking food safety certification; non-managerial foodservice workers; food handlers working at temporary foodservice operations; food handlers in daycare settings; and food handlers at congregate nutrition sites. Curricula has been developed and/or identified for use with each of these audiences as each has unique safe food handling needs. In 2005, 58 counties, representing all regions of North Carolina, sponsored trainings for 4,380 foodservice workers (39% managers; 28% workers; 2% temporary foodservice operations; 17% daycare settings; and 15% congregate nutrition sites). Most counties co-sponsored their training(s) with Environmental Health Specialists from their local health department. In addition to the agent-sponsored trainings, three Spanish-language certification trainings were offered to 36 foodservice managers (two in Durham and one in Greensboro). In 2005, 1,756 foodservice managers participated in Extension-sponsored food safety certification trainings, offered both in English and in Spanish. Of those participants, 74% successfully passed the certification exam. One needs to score a 75% or higher on the certification examination to pass. Knowledge about safe food handling is necessary so that one knows what safe food handling practices must be applied in the operation. Safe food handling is the primary way to prevent foodborne illness in the foodservice environment.

c. Scope: State Specific

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 and other clientele in the Southeast.

b. Impact: In 2005 one hundred fifty CDs on proper hand washing methods were produced and distributed. Moreover, a 7 minute video and DVD on Good Agricultural Practices food safety practices were prepared in English and Spanish and 1000 copies distributed across the region. Other educational materials were also produced and widely distributed including bilingual flip chart presentations for growers that cover Good Agricultural Practices for the packing house and a one page bilingual reminder list for use with field crews. Additionally, three statewide meetings on produce food safety were organized in North Carolina. Two training sessions were conducted for 10 North Carolina Extension agents charged with fresh produce food safety education, one on GAPs audits and one on food defense. The training of 200 Extension Professionals in Good Agricultural Practices has resulted in training 20,000 growers in the Southeast, the second largest number of third party audit certified growers in the U.S.

c. Scope: Regional - Southeast

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. 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 report outlines the immediate imperative of addressing overweight in all populations. The Institute of Medicine recently released their report "Childhood Obesity, Health in the Balance" that discusses the importance of addressing overweight prevention at an early age. These documents 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 for Americans and MyPyramid.gov to incorporate balance, moderation and variety in their diets as well as to increase physical activity. 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 2003 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-five 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 8.8. 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. Treatment of overweight and obesity is difficult. 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.

NCCE 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, Color Me Healthy, Moving Towards a Healthier You, Dining with Diabetes, SyberShop, Women Living Healthy – Women Living Well, Families Eating Smart and Moving More, 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 32,000 participants increased knowledge that will promote a healthier diet; many more were reached using mass media techniques such as newspaper, radio and television. Over 32,000 gained in knowledge concerning reducing risk for chronic disease, over 19,000 participants adopted behaviors consistent with decreasing the risk of chronic disease. Over 1,700 child care providers gained knowledge about the importance of good nutrition for the children in their care. As a result, over 13,000 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- $1,581,164
NCCES state FTEs – 6.5	County FTEs- 21	Program cost- $1,513,596
NC A & T state FTEs –1.0	County FTEs -.75	Program cost- $67,568

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 3,158
Number of participants making one or more positive dietary change 19,079
Numbers of participants increasing knowledge that will promote a healthier diet 32,869
Numbers of participants increasing skills that will promote a healthier diet 22,089

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 28,678
Number of participants who adopt one or more behaviors consistent with decreasing the risk of chronic disease 17,395
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 sugar 93
- Numbers who decrease excess weight 770
- Numbers who increase physical activity 6,100

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:
Over 1700 preschool teachers were trained in using Color Me Healthy in the classroom. These teachers reach an estimated 20,000 preschool children across the state. Over 13,000 preschool children were observed to improve eating patterns including more willing to try new foods. Also, over 13,000 preschool children were observed to improve physical activity patterns. Note: Color Me Healthy in an ongoing program, these numbers are for 2005 only.

SyberShop continues to be used across the state. Over 1,000 middle and high school teachers were trained to use SyberShop in the classroom. 8,994 teens increased knowledge and 6,797 adopted at least one positive health behavior as a result of using this multimedia CD.

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, 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 3,577
Number who showed improvement in one or more food safety practice 6,642
Number who showed improvement in one or more nutrition practice 11,657

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 shapes 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 1.) animal agriculture, 2.) plant agriculture (row crops, horticultural crops, and forestry), and 3.) 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. Recent NPDES (federal) and State general permits have presented opportunities for Extension to help producers meet this goal. With these recently adopted permits, producers are required to intensify monitoring of their waste handling systems. In addition, air quality concerns have come to the fore. Extension has played a vital role in the effort to help producers comply with the new regulations and emerging issues, thereby helping producers properly manage and operate their waste systems. This has been achieved by adapting educational programs and assistance to address the new regulations and issues. Examples include trainings on sludge surveys of waste treatment lagoons, and providing information on waste management equipment and methods that reduce odor.

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.

Recent "basin-wide" rules in North Carolina have provided Extension the opportunity to help stakeholders meet the regulations contained in these rules and in so doing protect water quality, while still maintaining

economic output. The Neuse River Project team formed in the late 90's continues to assist farmers and other stakeholders reduce nutrient inputs to the basin even after the goal of 30% reduction in nitrogen loading had been met. More recently, the Tar-Pam basin rules have benefited from Extension's involvement, from membership in the basin oversight committee, to directly working with farmers and producers to meet goals set forth in the rules.

Phosphorus rules contained within the overall basin-wide rules and meant to improve water quality are being met with the assistance of Extension. Extension has taken this opportunity to help develop PLAT (Phosphorus Loss Assessment Tool) to help growers identify and adopt practices to reduce Phosphorus loadings to waterways.

The growth of the "green" industry in North Carolina including turf farms, nurseries, and the increase in landscaped areas continues to challenge Extension. Extension responded by providing training and certification of pesticide applicators, as well as other certifications that apply to this industry and the more traditional field crop and forestry areas.

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.

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. Partnering with State agencies continues to be one of Extension's strengths. One example of this is a 319 grants administered by the State given to Extension for training in land application based animal waste systems. This type of funding helps to leverage Federal funds in providing training to producers and growers

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 $5,549,525
NCCES FTEs -State 31	County - 58	Program cost- $5,475,365
NC A & T FTEs - State .85	County - .75	Program cost- $74,160

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.

Extension have provided trainings in several counties helping producers do lagoon sludge surveys, calibrate their waste application equipment, perform soil and waste sampling, and to provide guidance on pasture management. Not only do these trainings meet the goal of complying with permits, they also help the producers directly link management with environmental quality, rather than having a third party fulfill permit requirements (surveys, calibrations, etc.)

b. Impact: In 2005, the number of producers utilizing approved waste management plans numbered 4,879 and the number of farms adopting waste management-related BMPs totaled 317. 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 about $220 million dollars.

These impacts were achieved, in part, by training leading to the certification or maintenance of certification of 4,490 operators of land application systems, and soil and waste analysis on about 290,000 and 160,000 acres respectively.

c. Scope: State Specific

KEY THEME: Soil Erosion

- 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). Nutrient enrichment of streams and water bodies is exacerbated by erosion since transport of nutrients, especially Phosphorus can occur with sediment particles. 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. Vegetated buffers also help reduce transport of eroded soil, and Extension continues to convey research findings and provide recommendations on buffers via bulletins and educational programs.

- Impact: In 2005, soil erosion was reduced by 19,455 tons due to adoption of soil erosion related BMPs. In addition, an estimated 312,209 tons of soil was saved though BMPs adopted on pastures, feedlots, and waste application fields. These impacts were achieved by adoption of conservation tillage and no-till systems, and field buffers and other conservation practices.

c. Scope: State Specific

KEY THEME: Nutrient Management

a. Issue: Improper application of animal waste, as well as application rates of inorganic fertilizers in excess of agronomic requirements, 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 (e.g., lawns, golf courses, and wastewater 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.

Extension has responded through a number of programs. One such program helps growers identify soils high in Phosphorus, and reduce Phosphorus inputs on these soils while maintaining crop yield. Another

example is the work of Extension to help develop nutrient management plans for nearly 25,000 acres and to assist with the installation of water control structures to aid controlled drainage in a watershed. Extension has also worked with animal and poultry producers in concert with NRCS personnel to help producers write and amend nutrient management plans. The goal has not only been to develop and update plans but to help producers understand the linkage between nutrient management and water quality.

b. Impact: Commercial fertilizer applications were reduced by a total of 88,545 pounds (N+P) compared against conventional rates through establishment of BMPs such a field borders, adoption of reduced tillage systems, and application of nutrient management plans.

c. Scope: State Specific

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.

Extension regularly works with state and federal agencies and provides guidance to these agencies. Examples of this are the interagency "1217" work group centered on animal waste and nutrient management and comprised of state agencies, Extension, and Research; and the "Neuse River Team" that works with state agencies and provides education on agriculture and water quality. In addition, the 4-H program within Extension works with youth in issues of environmental stewardship within the realm of agricultural production.

b. Impact: A total of 23,431 people, particularly youth, were made aware of the link between agriculture and the environment, while 496 people increased there participation in policy making. In addition, 199 people adopted practices to promote sustainable ecosystems.

c. Scope: State Specific

KEY THEME: Integrated Pest Management

a. Issue: Application of pesticides (herbicides, insecticides, fumigants, etc) are used for plant protection to increase yields and profits, but can have adverse impacts on humans and the environment. Pesticides can affect worker safety during handling and application; affect water quality if stored, applied, or disposed of improperly; and potentially lead to resistant strains of insects and pathogens. In order to address these issues, Extension has developed and maintained training and certification programs in pesticide use, and alternative pest management strategies. For instance, a two-day training was held for extension agents,

growers and industry on alternatives to Methyl Bromide. Education programs also have promoted the use of new spray nozzles that reduce pesticide drift.

b. Impact: Field crop producers reduced their use of pesticides by over 12,000 pounds (expressed as active ingredient) in 2005. This in part was achieved through the use of integrated pest management on about 190,000 acres and biological control on almost 4,000 acres. Savings in production costs associated with proper and reduced pesticide use amounted to about $2.4 million. Much of these impacts can be traced to the training and certification of commercial pesticide applicators, consultants, and dealers. Over 18,000 pesticide applicators were certified or maintained certification in 2005.

c. Scope: State Specific

KEY THEME: Yard Waste/Composting

a. Issue: Up to 75 percent of what is discarded by North Carolina's communities and businesses are organic materials. Instead of disposing of food scraps, yard wastes, and other organics, the materials can be composted or vermicomposted. These methods of recycling can convert organic materials that have traditionally been viewed as waste into a valuable soil amendment for plants and crops. Compost and vermicompost products have many applications including home gardening, landscaping, turfgrass and golf courses, DOT projects, use in potting soil for the horticultural industry, and in agriculture. Compost was recently approved as a best management practice (BMP) for erosion-control projects. Vermicomposting and composting may also be used to manage hog waste and other types of animal manures, and be used in animal mortality management.

Extension has addressed this issue through training and demonstration. A compost training facility has been developed at NCSU's Lake Wheeler Field Labs as part of the Soil and Water Environmental Training Center.

b. Impact: Community solid waste departments, farmers, businesses, institutions, and citizens have significantly reduced their waste disposal costs, saved money in soil amendment product costs, and/or conserved landfill space and natural resources. Over 600 North Carolina solid waste managers and citizens reported the use of composting (including vermicomposting) in 2005.

c. Scope: State Specific

KEY THEME: Riparian Management

a. Issue: The areas near streams server to protect water quality and conserve animal habitat. Many animal produces and farmers may not know the benefits of these areas and some have traditionally farmed right up to the edge of the creek. Unprotected riparian areas can lead to streambank instability and loss of land, increased transport of nutrients to streams and loss of wildlife habitat. In urbanizing areas, loss of some riparian areas is inevitable, so it is imperative that the remaining areas be conserved and managed correctly.

Extension has addressed this issue through education on riparian BMPs including field buffers, field borders and strips; teaming up with Natural Resources Conservation Service to promote the Conservation Reserve Enhancement Program; and providing trainings on stream restoration design and construction.

About 100 consultants, agency personnel and other watershed professionals competed stream restoration training in 2005.

b. Impact: Over 52,000 feet of vegetative buffer or riparian areas were reported restored in 2005. In addition, about 5,000 linear feet of stream was reported to be improved by stream BMPs.

c. Scope: State Specific

KEY THEME: Pesticide Application

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 and consumer safety, beneficial insect populations, and other environmental protection issues. To become certified participants must pass a multiple choice exam administered by NCDA&CS. To maintain certifications applicators 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 20,288 private pesticide applicators (farmers who use restricted-use pesticides) in North Carolina, 610 were newly certified in 2005 and 12,058 were recertified by attending CES training programs. Even with newer, safer and more concentrated products, the adoption of nearly 8,157 new pesticide BMPs including scouting and biological control significantly reduced pesticide usage on 180,221 acres. Moreover, through the effective training and advertising of the pesticide container recycling program, 87,792 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 $2.43 million.

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.

Statement of Issue

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 increased from 6.8 million in 1990 to over 8.6 million in 2005. During this same time period, the ethical and racial diversity has increased due to wide variations in the rates of change among various groups. Based on US Census data, the Hispanic population of North Carolina grew by 423 percent, compared to 129 percent increase for Asians, 26 percent for African-Americans, and 23 percent for whites. A recent study of the Latino population estimates that the growth in numbers of Hispanics from 1990 to 2004 has been in excess of 700 percent. In addition, North Carolina has a significant and growing Native American population estimated to be greater than 100,000 people in 2004. The population is also diverse in terms of age with the retirement age segment growing due to in-migration as well as birthdays. The financial well being of the citizenry also varies widely from the most rural areas to the high tech areas of Research Triangle Park. North Carolina has a wide range 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 industry in the Piedmont, to the farming industry that spans the state. There are many large industrial businesses as well as a rapidly increasing cottage/small business component of the state that contribute to the economic well being of our citizenry.

The diverse population described above faces many social and economic challenges. Some of these challenges stem from the fact that the world now functions in a global economy rather than relying totally on the local economy. 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 increased cost of living that has forced the "second spouse" to enter the work place. This puts more stress on the family unit while it creates a real need for improved child care and more child care providers. The decline in the demand for and the availability of entry level manufacturing jobs resulting from these firms moving off shore has put financial stress on a significant portion of the state's population. Other challenges occur as a result of North Carolina becoming a prime retirement state as well as experiencing an aging population of its own. Some challenges are the result of a society that may be three to five generations removed from actual production agriculture. This has resulted in a society that is less understanding and less appreciative of production agriculture and the related "value added" industries. The discontinuation of the peanut and tobacco programs is causing significant economic uncertainty and emotional stress for many local farm families. The ever-growing concern for a quality environment has resulted in increased regulatory legislation and this is yet another challenge facing production agriculture as well as our citizens as a whole. These and many other social and economic challenges put our 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 severe economic and social challenges characterized above. Improved understanding of the economic and social issues that exist today and the necessary leadership skills to face and meet these challenges is at the foundation of the extension education program in North Carolina. North Carolina Cooperative Extension has designed and is delivering an inclusive educational program which improves the likelihood that the diverse audiences outlined above will reach their full potential. Continued evaluation of existing programs will ensure that all facets of the citizenry will be reached with our educational programs, and that the programs meet the needs of the diverse clientele.

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 $7,767,784
NCCES FTEs -State 19	County - 130	Program cost- $7,523,549
NC A & T FTEs - State 2	County - 4	Program cost- $244,235

Key Theme: Aging / Estate Planning / Retirement Planning

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 57 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.

Impacts: During 2005 there was increased interest in financial and estate planning workshops because of passage of the tobacco buyout legislation. There were 891 individuals who reported improved money management skills including implementation of a savings plan to increase their financial security in later years. There were also 2,404 participants who reported improved financial practices and knowledge gained through attendance at financial management sessions. Estate planning programs were conducted in eight 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 1,167 limited resource (LR) and 1,237 non-limited resource (NLR) increased their knowledge about estate planning and an additional 1,325 people reported that they had increased their knowledge about the need to prepare for possible mental incompetency. As a result of programs, an additional 408 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 1,150 individuals reported executing legal documents to prepare for future incompetency and dependency. Finally, 614 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. In 2005, local officials in twelve 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: During 2005, 322 communities engaged in community visioning, planning, and devising constructive solutions to community development problem solving. There were 1,536 people who reported that they increased their knowledge of economic development principles. The number of communities involved in community enhancement and revitalization efforts equaled 779. Communities reported that they saved $1,294,523 as a result of achieving successful resolution of community issues. One hundred and forty-eight businesses were retained or saved as a result of economic development programs and $1,024,115 in revenue was retained by local communities. During 2005 425 new jobs were created and 706 jobs expanded in existing businesses. There were 157 non-limited and limited resource new marketing venues established or sustained in 2005 that resulted in $201,160 in additional income generated. Business expansion resulted in an additional $1,055,300 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 State University led program efforts that helped rural communities who are increasingly expected to design more local solutions to problems and issues. There were 844 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, 373 were able to develop and implement action plans that resolved community problems. Two hundred and thirty-three people who developed action plans identified themselves as limited resource participants while 140 people were nontraditional participants. A total of 110 community issues were resolved or completed.

b. Impacts: A total of 227 limited resource and nontraditional individuals increased their capacity to provide service to the community. Successful resolution of community issues resulted in $723,217additional savings available to local communities. To continue finding solutions to problems, individuals formed 57 new community organizations.

c. Scope: State Specific

Key Theme-Family Resource Management

a. Issue: A total of fifty-seven 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. Program efforts were intended to increase awareness and knowledge about money management practices, to change attitudes towards developing and using money management plans, and to have participants adopt decision-making practices that would help them achieve their family financial goals.

b. Impacts: The number of North Carolina citizens who increased their knowledge and skills in goal setting, budgeting, and record keeping was 10,534 and the number of people who actually developed a money management plan was reported to be 1,526. An additional 2,789 people wrote down financial goals while 860 individuals also developed debt management plans during 2005. A total of 1,241 reported a lifestyle change to improve their financial status. There were 1,565 individuals reported improved financial status due to adoption of practices and skills learned in workshops. There were 700 individuals who reduced debt loads by a reported amount of $33,167. Participants estimated savings totaled $32,638 during 2005.

c. Scope: State Specific

KEY THEME: Child Care

a. Issue: Available and quality after school programs provide safe, supportive, and stimulating environments for youth and help working parents balance work and family. North Carolina 4-H state and county staff provide leadership to state and national organizations promoting affordable, quality after school care. State and county 4-H programs contributed to a dramatic increase in after school capacity in the past decade. However, increasing demands by all families and declining subsidies for limited resource families mean that quality after school care is unavailable to many North Carolina youth. This fact was dramatically illustrated when the state Division of Child Development identified unmet needs for summer care for some 75,000 youth.

NC 4-H state and county staff continue to work with schools, churches, community-based organizations, parent groups and business groups to meet school-age care needs in ways that foster positive youth development. Declining resources and increasing demands for performance outcomes increased the difficulty of this task. Nevertheless, 4-H staff have been equal to the task, and funding for Extension-managed as well as Extension-supported programs continues to increase. This trend is due, in large part, to the skills of 4-H state and county staff in building collaborations, then writing high-quality grant proposals, then providing training, and learning resources to implement programs once they are funded.

b. Impacts: 4-H county programs reported $1,151,057 in new funding and $896,834 in sustained funding for after school programs. Two hundred and nineteen (219) new collaborative projects and 136 school-age care centers were established in 2005.

- NC 4-H implemented 47 new programs in 2005, representing 1,293 additional after school spaces.
- Seventy-seven (77) new collaborations serving children and families were formed while 412 existing collaborations were sustained.

c. Scope: State Specific

KEY THEME: Leadership and Volunteer Development

a. Issue: NC youth and adults are encouraged to pursue volunteerism as both a means to an end, and as an end in itself by focusing upon the gifts and assets that each individual volunteer has to contribute towards the CES and 4-H visions. County 4-H programs emphasize various "streams" of volunteerism for both youth and adults, including 4-H club leaders, special emphasis volunteers, school enrichment volunteers, day and resident camp volunteers, after school volunteers, master volunteers, and advisory leaders. A target focus is for teen 4-H members to volunteer as teachers of younger youth, while coached by adult volunteers, in the new NC 4-H Teens Reaching Youth through Innovative Teams (TRY-IT) program. The objective builds upon volunteerism research and best practices that contribute to meaningful and safe educational experiences for youth, volunteers, and paid staff.

b. Impacts

- 4,844 current 4-H youth volunteers (including 1,722 from limited resource backgrounds) indicated new knowledge gained regarding volunteerism
- 4,603 current 4-H adult volunteers (including 1,686 from limited resource backgrounds) indicated new knowledge gained regarding volunteerism
- 4,289 current 4-H youth volunteers (including 1,301 from limited resource backgrounds) indicated positive attitude changes regarding volunteerism
- 3,508 current 4-H adult volunteers (including 1,260 from limited resource backgrounds) indicated positive attitude changes regarding volunteerism
- 3,148 new 4-H youth volunteers (including 1,142 from limited resource backgrounds) indicated new knowledge gained regarding volunteerism

- 4,844 new 4-H adult volunteers (including 3,245 from limited resource backgrounds) indicated new knowledge gained regarding volunteerism

- 2,095 new 4-H youth volunteers (including 958 from limited resource backgrounds) indicated positive attitude changes regarding volunteerism

- 1,618 new 4-H adult volunteers (including 744 from limited resource backgrounds) indicated positive attitude changes regarding volunteerism

- 1,358 4-H youth volunteers (including 433 from limited resource backgrounds) served in expanded and/or additional volunteer roles in 4-H

- 821 4-H adult volunteers (including 227 from limited resource backgrounds) served in expanded and/or additional volunteer roles

- 794 4-H youth volunteers (including 258 from limited resource backgrounds) served in expanded and/or additional volunteer roles in their communities

- 968 adult volunteers (including 366 from limited resource backgrounds) served in expanded and/or additional volunteer roles in their communities

c: Scope: State Specific

KEY THEME: Resilient Youth, Families and Communities

a. Issue: North Carolina youth, families, and communities are challenged by the increasing pace of life, economic instability, and social isolation from family and friendship networks. Limited resources and risky behaviors increase challenges. Programs targeted to building assets and preventing risk behavior foster positive developmental outcomes for youth.
Communities across the state increasingly engage 4-H programs to help youth at risk to learn health and life skills, science and technology, entrepreneurship and career skills, and academic skills. Mentoring and community restitution programs connect youth to positive role models and relationships. 4-H county programs are innovators in involving youth with limited resources or behavior problems in positive, transformative programs.

b. Impacts
4-H programs effectively increase internal assets (stress management, problem-solving, character and communication skills) (3,806 youth reporting) and external assets (caring adults, positive community norms) (4,107 youth reporting), and positive alternatives to risk behavior (refusal skills, academic skills, extracurricular involvement) (4,640 youth reporting) that provide a foundation for positive choices in teen years into adulthood.

Youth involved in after school enrichment, mentoring, restitution, teen court, and camping programs consistently report increased life skills (4,768 youth), academic performance (2,560 youth) and reduced risk behavior (3,964 youth) and judicial involvement (2,787 youth). Community service (2,679 youth) engages youth contributions and strengthens connections to positive role models, neighbors, and continued involvement in 4-H.

c. Scope: State Specific

KEY THEME: Youth Development

a. Issue: Youth of this country have more opportunities for educational experiences in their daily lives than ever before. Formal learning is only the beginning. Today, youth can gain information and knowledge through media, the World WideWeb, the workplace and community involvement. 4-H clubs offer non-formal hands-on experiences as well as more traditional modes of learning. 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 responsible citizens. In 2005, the 4-H Club Program, placed emphases on helping young people improve their decision-making skills, communication skills, managing relationship and serving their community.

In 2005, a total of 34,936 young people between the ages of 5 to 19 participated in 4-H club programs. The positive youth development of young people through 4-H club programs can be illustrated by the following program impacts: 32,019 youth have increased their decision making skills; 30,818 increased their communication and interpersonal skills; 21,706 increased their knowledge of community service opportunities and 22,970 increased their competency in managing relationships.

b. Impacts

- Increased communication skills 19,786
- Number of you competing in Public Speaking programs 2,254
- Increased leadership skills 12,815
- Increased awareness of community service 21,706
- Increased decision making skills 24,466
- Number of new families involved in club programs 3,397
- Number of families sustaining active club programs 12,638

  Agents reported that over 16,035 families are actively involved in 4-H club programs across North Carolina, an increase of over 27% from 2004, and that 374 new 4-H clubs were formed for youth ages 5 to 18 in 2005.

- $424,673 saved by communities from 4-H community service projects
- $488,793 scholarships received by 4-H'ers
- $546,216 earned as a result of their project work
- $468,933 saved by 4-H'ers as a result of their project work

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, and another needs assessment process has been launched that will be completed in early 2006. 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. Additional adjustments were made in 2005 based on inputs and suggestions from the practicing Extension professionals who actually implement the various programs. 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, all of 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 2005, NCCES had documented multistate activities using Smith-Lever B & C funds amounting to $475,067. This funding level exceeded the originally planned expenditure of $196,961 by $278,106. 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 2005.

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. 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, 56 had significant Smith-Lever B & C funding allocated for all or part of the Extension funding in 2005. For fiscal year 2005, these B & C funds amounted to $2,255,386. This funding level continued to exceed the originally planned expenditures for Integrated projects that has occurred over the span of the planning cycle. For 2005, the original plan called for an expenditure of 14.2%, or a total of $1,495,640. The actual expenditure exceeded the plan by $759,746.

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.

Title: SERA-IEG

Competitiveness and Sustainability of the Southern Dairy Industry

Amount funded: $ 6,662

Report: This SERA is scheduled to run through 9/08. A major activity of the SERA in 2005 was planning and conducting the Southern Dairy Conference held in Atlanta in February, 2005. The agenda included information on milk marketing, national dairy and trade policy issues, obesity & health issues, and a new air quality initiative for livestock farms. 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 and staffing needs in support of the economic, profitability and sustainability of the regional dairy industry.

Program 2.

Regional Orchard Management Program

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

Amount funded: $ 13,600

Report: This program has now completed a long-term evaluation of high-density apple orchard systems utilizing dwarf rootstocks with the cultivar 'Golden Delicious'. High-density orchard systems showed greatly enhanced productivity 16 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. Evaluation of new apple cultivars with respect to their suitability for the region is ongoing, and appropriate management techniques are being developed for the most promising cultivars. On-farm studies were also utilized in close collaboration with participating growers throughout the region as a technology transfer agent to demonstrate the benefits of promising new technologies for enhancing fruit quality and/or production in a commercial context. Orchard sprayer calibration workshops were held in collaboration with county agents and regional research stations to ensure that growers are using current best practice methods for pesticide applications. 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 - Southern Region Small Fruit Consortium

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

Amount funded: $57,036

Report: In 2005, the NCCES program specialist in strawberries provided 9 out-of-state Strawberry plasticulture Workshops and Agent In-Service Trainings in Virginia (2), Georgia (2), South Carolina (2), Arkansas (2) and Illinois (1). There were more than 500 producers and agents directly impacted by those meetings in these other states. The program specialist also acted as mentor to two new small fruit extension specialists in Virginia (Dr. Jeremy Pattison, VA Tech – Blackstone) and Arkansas (Dr. Elena Garcia, U of A, Fayetteville), respectively. A CUE application for methyl bromide for 2007 was submitted to US-EPA for a Southeastern Strawberry Consortium of 14 states in August 2005. A regional strawberry plasticulture program was conducted for new growers in High Point, North Carolina, as part of the Southeastern Strawberry Expo (11.03.05). The specialist in strawberries also provided leadership to the development of two new critical documents that appear on the website of the multi-state Southern Region Small Fruit Consortium:

1) 2005 Southeast Regional Strawberry IntegratedManagementGuide (http://www.smallfruits.org/SmallFruitsRegGuide/Guides/2005StrawberryIntegMgmtGuidefinal.pdf) , and
2) 2005 Southeast Regional Strawberry Plasticulture Production Guide (http://www.smallfruits.org/SmallFruitsRegGuide/Guides/2005culturalguidepart1bs1.pdf.

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: $35,100

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: $33,860

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.

Report: This project ended in 2002. Amount funded: $0

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, $33,115

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: $7,500

Report: The National Swine Educators Conference was planned by a representative from pork producing states and producer education personnel from the National Pork Board. There were 14 participants from NC in 2004. These participants/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.

Amount Funded: $19,786

Report: Fifteen (15) youth and adults from North Carolina participated in the 2005 Southeastern U.S. Dairy Youth Retreat that was held in South Carolina. Youth from NC, SC, VA, GA and FL participate in this annual educational retreat. Through educational workshops, youth increased their knowledge of the dairy industry in the Southeastern U.S. In addition, North Carolina 4-H dairy judging teams (8 youth total) competed in contests including the Pennsylvania Invitational Youth Dairy Cattle Judging Contest held in Harrisburg, PA, (3 youth) the National Contest held at World Dairy Expo in Madison, WI (4 youth) and the North American 4-H Contest held in Louisville, KY (4 youth). The North Carolina 4-H Dairy Quiz Bowl Team (4 youth) also competed in the North American 4-H Quiz Bowl Contest held in Louisville, KY.

Program 10.

Title: 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 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: $21,655

Report: An in-service training was held for 45 livestock and dairy agents in February, 2005. Similarly, information on the project was shared in one day session to another group of 25 NRCS workers from around the nation plus 4 extension agents from NC. Information from our dairy grazing work was also shared at 3 producer meetings in NC, 1 meeting in Tennessee, and 1 meeting in Virginia as part of programs designed to investigate possibilities for organic dairy production in the southeastern US. Information on rearing dairy steers without use of anthelmintics was presented at the national meeting for the American Society of Animal Science and the American Dairy Science Association.

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: $49,932

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 successfully 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. By combining lysozyme and nisin, we observed a significant reduction in the relative heat resistance of Listeria monocytogenes in comparison to only heating. 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 low income older adults, a program with 14 educational modules involving North Carolina and other states in a collaborative arrangement for program development and implementation of nutrition education materials for older adults.

Amount funded: $18,000

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 specifically designated funding ended in 2004. However, the program will continue to be delivered across North Carolina and in other states by the individual states who are overall collaborators in this program.

Program 2.

Elderly Nutrition Extension (ENE) Core Group (Now divided into 2 groups: the Aging Subcommittee to the Advisory Council for Public Policy for the Society for Nutrition Education; and the Healthy Aging Division of the Society for Nutrition).

The Aging Subcommittee to the Advisory Council for Public Policy for the Society for Nutrition

Education is composed of 13 members across the nation and focuses on bringing to light information and assistance to improve the attention to older adult nutrition issues. The Healthy Aging Division is now a group of 60 or more individuals across the nation focusing on planning curricula, program delivery means and expertise in older adult nutrition programs. The Healthy Aging Division has submitted a program to be held as part of the SNE annual meeting next summer. Approximately 60 institutions are involved in these two newly developed groups which are currently meeting via conference calls every month.

Amount funded: $28,250

Report: NCCES faculty chaired the Elderly Nutrition Education (ENE) Core Group up until midyear and now co-chairs the Aging Subcommittee made up of the ENE members and other professionals from across the nation. The coordinating core group was originally 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 were to advance the understanding, research base and promotion of nutrition education for the older adult audience. Over the years the group has sought to raise the attention to older adults across the nation and at our primary national meeting, the Society for Nutrition Education. We have been highly successful. This year the ENE core group has joined forces with others to become two new entities that are linked together for a common purpose. They are: 1) a new division for the Society for Nutrition Education, the Healthy Aging Division, which we established last July with approximately 60 members; and 2) a new public policy subcommittee for the Society for Nutrition Education, the Aging subcommittee which we co-chair.

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: $12,980

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: $10,915

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: $6,666

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 recent years, 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 2005, $20,000 was expended for this effort, of which one third 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: $24,500

Report: This program is focusing on training Extension educators in the Southern Region, 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.

Program 3.

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

Amount funded: $49,210

North Carolina 4-H staff served in an advisory capacity for the 2005 fiscal year on the Regional Planning Committee. In this capacity, electronic files were shared, multiple teleconferences were held and additional correspondence was required. 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 2005 delegation consisted of 79 North Carolina 4-H staff and volunteers with a total of 14 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.

Other multi-state participation includes service in a two year term on the planning team for the National Conference on Volunteerism in Extension, a biennial meeting for all state and district specialists working in positions related to volunteerism in any Extension program area, began in late in calendar year 2003. This conference was held in April, 2005, in Arkansas, with North Carolina staff handling the overall conference evaluations and workshop evaluations processes.

Program 4.

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

Amount Funded: $21,700

The Children, Youth and Families Extension network is funded by ES-USDA. NCCES faculty serves on the national CYFERnet Parent/Family Editorial Board. As of September 4, 2005, there were 2246 Parent/Family resources, representing 32% of the total number of resources on the CYFERnet database. This year, board members identified and reviewed 591 new resources to fill the resource gaps in the particular areas of partner violence, domestic violence, violence prevention, adolescent development, sibling rivalry, and healthy sexuality and behaviors. *Best Practices in Parenting Education* (including a segment on information on using CYFERnet resources) were presented at both the National Smart Start Conference and during the CYFAR 2005 conference.

During the year, the Editorial Board conducted two electronic seminars (January 24-28, 2005 and February 21-25, 2005). The Family Life E-seminar, *Grandparents Raising Grandchildren: New Opportunities for New Relationships,* was a collaborative effort co-sponsored by Ohio State University Extension, The University of Wisconsin-Extension, Pennsylvania State University, Purdue University, CSREES and CYFERnet-Program.

Program 5.

National Extension Parenting Educators' Framework

Amount Funded: $4,600

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. Representatives from four of the original universities submitted the framework for publication to a scholarly journal and are awaiting notification. The Universities involve NCSU, University of Arkansas, University of Georgia, and Purdue. As well, this (smaller) team is planning a validation study for the framework that will be announced in November during the National Council on Family Relations conference.

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: $20,000

Report: the Extension Cares Initiative essentially concluded by mid 2005 (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. We were involved with CSREES in initiating a planning group to make recommendations to the 4-H Cooperative Curriculum System on development of user-friendly resources for afterschool settings. The group completed a review, developed a survey for Extension staff input. Another curriculum development activity involved the 4-H Cooperative Curriculum System Robotics Design Team. Following up on a survey of Extension staff nationwide, a design team worked with Carnegie-Mellon University to develop a robotics curriculum for 4th-6th graders, complete with helper guide and career study kit. The curriculum will be piloted and reviewed in 2006.

Multistate Programs 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 2005: $475,067

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.

Projects listing for 2005 for all Smith-Lever integrated projects

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

Integrated Project	Project #	Name
Small fruit diseases and their control	6747	Cline
Disease Management of Ornamentals in	6683	Warfield

Greenhouses and Nursery Crop Production		
Orchard Systems and Production for a Successful Apple Industry	6758	McArtney
A National Model for Agroecology Instruction	8900	Linker
Production Strategies For Improved Vegetable Production and Alternative Crops For Diversification	6596	Schultheis
Cover/Biofumigant Crops Influence Vegetables	6796	Sanders
Weed management for small fruits and vegetables	6735	Monks
Weed management in turfgrass and forages	6704	Yelverton
Genetic and production environmental influences on processing and planting quality of nutritionally enhanced soybean seed	6632	Spears
Precision agriculture for agronomic crops and nitrogen management for corn in Eastern NC	6425	Heiniger
Small Grains Breeding Investigations	6194	Weisz
Development and refinement of strategies for peanut production in NC	6466	Jordan
Developing New Crops and Sustainable Production Systems For Vegetables and Medicinal Herbs	6595	Davis
Rootstock and interstem effects on Pome and Stone Fruit trees	1840	Parker
Farming System Impacts on Strawberry and Tomato Diseases and Soil Microbial Ecology: Short and Long-Term	6641	Louws
Management of Arthropod Pests of Turf and Peanut	6731	Brandenburg
Ecology and management of European corn borer	0205	VanDuyn
Weed management and growth regulators for agronomic crops	6417	York
Plant nutrition programs for mountain crops	6558	Rideout
Cultural Management of Strawberries and Grapes	6324	Poling
Economic Evaluation of Technical Change in Cotton, and Peanut Production	5735	Brown
Small fruit production systems	6681	Fernandez
Integrated Peach Disease Management	6160	Ritchie
Management of arthropods on fruits and vegetables and Western North Carolina	6402	Walgenbach
Best Management Practices for Anti Gibberellins in Floriculture Production	6718	Whipker
Biological Control of Anthropoids Pests and Weeds	0303	Orr
Risk aversion, risk shifting and alternative payment mechanisms in settlement of broiler contracts	6527	Vukina
Economic Decision Support For Sustainable Ag Products	6528	Wossink
Use of alternative supplements in grazed, hayed and ensiled forage systems for beef cattle	6736	Poore

Nutritional Strategies to Improve the Growth, Productivity, and Profitability of Dairy Cattle	**6605**	**Hopkins**
Improving reproduction and management of dairy cattle	**6600**	**Washburn**
Use of feed additives to reduce aflatoxin transfer to milk.	**6778**	**Whitlow**
Genetic approaches to enhance efficiency and profitability of pork production	**6792**	**See**
Nutritional approaches to enhance swine production efficiency and profitability	**6777**	**Van Heugten**
Maximization of laying hen performance Economic Return, and Egg Quality	**6184**	**Anderson**
Fish Food Ingredients Produced By Solubilization/Reprecipitation	**6616**	**Green**
Mountain aquaculture research	**6153**	**Hinshaw**
Strategies to Increase Meat Goat Production	**6701**	**Luginbuhl**
Integrating Crops and Livestock Systems	**6602**	**Mueller**
Price Risk Management Strategies in Food and Grains Marketing	**6781**	**Piggott**
Economics of adoption of agricultural technologies	**6610**	**Marra**
Developing Strategies for Improved Pasture Fly Management	**6803**	**Watson**

Small fruit diseases and their control (Cline)
Project 6747
Blueberry cultivars grown in northern states are neither climate adapted or disease resistant in the hot, humid South. As a result, "minor" diseases such as leaf spots and stem cankers become major impediments to production. In an on-going effort, U.S. Department of Agriculture and North Carolina State University plant pathologists have worked hand-in-hand with plant breeders to develop disease-resistant blueberry cultivars adapted to low-chill climates. Disease investigations, control practices, and recommendations tailored for the extended growing season of the South have been under continuous development.

Disease Management of Ornamentals in Greenhouses and Nursery Crop Production
Project 6683 (Warfield)
Needle blight, caused by Passalora sequoiae (syn. Cercosporidium) has become a serious and widespread disease problem on Leyland Cypress grown as nursery stock and Christmas trees in container and field nurseries in North Carolina, and throughout the southeastern United States. The popularity of Leyland Cypress for use in landscape plantings has been increasing since the late 1980's and continues strong in the southeast today primarily due to its rapid growth habit that is favored for privacy plantings and windbreaks. Plant pathologists at NCSU began monitoring environmental conditions and spore dispersal patterns at two nursery locations with a history of needle blight in the summer of 2005. In order for fungicides to be effective, based on our data, applications would have to be made at regular intervals throughout the entire summer and fall to maintain a protective covering on susceptible plant tissues.

Orchard Systems and Production for a Successful Apple Industry (McArtney)
Project 6758

This program has now completed a long-term evaluation of high-density apple orchard systems utilizing dwarf rootstocks with the cultivar 'Golden Delicious'. High-density orchard systems showed greatly enhanced productivity 16 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. Evaluation of new apple cultivars with respect to their suitability for the region is ongoing, and appropriate management techniques are being developed for the most promising cultivars. On-farm studies were also utilized in close collaboration with participating growers throughout the region as a technology transfer agent to demonstrate the benefits of promising new technologies for enhancing fruit quality and/or production in a commercial context. Orchard sprayer calibration workshops were held in collaboration with county agents and regional research stations to ensure that growers are using current best practice methods for pesticide applications. 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 Linker
Designed and implemented a pest monitoring system for the large-scale, long-term systems experiment at the Center for Environmental Farming. A unique plan was required for each crop. This plan was used to train graduate students and an intern in the summer program at CEFS. We developed curricula for the summer session, arranged faculty to teach weekly, and set up special instructional opportunities. Thirteen students enrolled and completed the session. The students conducted a short-term research study (beneficial insect habitat on student farm), analyzed the data, developed a poster, and presented results at the organic unit field day. Also, 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.

Production strategies for improved vegetable production and alternative crops for diversification (J. Schultheis)
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.

Cover/Biofumigant Crops Influence Vegetables
Project 6796 (Sanders)
Controlled micro biotic compost improved crop growth and yield in the 5 Th year. We completed 3 year study of compost to determine if it can be an alternative to methyl bromide; we continued studies on use of biofumigant crops and compost for management of weed, disease and nematode pests in tomato, pepper and cucumber; and continued study of rotational systems for soil organic matter and compost determining nutrient cycling in vegetables.

Weed management for small fruits and vegetables (Monks)

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 (Yelverton)
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 (Spears)
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 (Heiniger)
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.

Small Grains Breeding Investigations
Project 6194 (Weisz)
Our research has shown that the tissue test that was originally developed in VA for determining optimum Spring N rates has a fundamental flaw. It was developed for wheat fields that met a very narrow set of criteria, but has been used widely across the region. We have now re-calibrated this test across the entire range of conditions that our growers face, and found that different models must be used depending on how well developed the wheat field is at the time of testing. I believe that when we get this new test out to the growers it will result in substantial improvements in N use efficiency. Also, we started the "SmartGrains" newsletters which get sent out electronically, are published on a University website. One on hard wheat

production in NC has been widely requested and was especially pointed out by the growers association as timely and helpful.

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

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 (Davis)

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 (Parker)
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 (Louws)

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 (R. Brandenburg)
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 (Van Duyn)
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 (York)
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 (Rideout)
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 (Poling)
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 (B. Brown)
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, and produced the 2005 Outlook and Situation." 2005 Peanut Information, North Carolina Cooperative Extension Service Publication, AG-331:1-4, January, 2005, and the "Cotton Situation." 2005 Cotton Information, North Carolina Cooperative Extension Service Publication, AG-417:1-5, January, 2005.

Small fruit production systems
Project 6681 (Fernandez)

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 (Ritchie)
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 (Walgenbach)
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.

Best Management Practices for Anti Gibberellins in Floriculture Production
Project 6718 (Whipker)
Two guides, a Pansy Production Handbook and Pansy Disorder Photo cards, 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.

Biological control of arthropod pests in weeds
Project 0303 (Orr)
Insect populations and crop damage were compared in organic and conventional cropping systems, and beneficial insect habitat use on organic farms was evaluated. Workshops and training on these subjects were provided to audiences across the state. Quality control studies of commercially available beneficial insect habitat seed mixes are providing a way for growers to distinguish between quality products and suppliers, something they were previously unable to do. Ongoing work comparing insect populations in organic and conventional cropping systems will provide organic growers with sorely needed information on insect management. The ongoing studies on beneficial insect habitat will also provide organic growers guidance on how to improve their insect management systems.

Risk aversion, risk shifting and alternative payment mechanisms in settlement of broiler contracts
Project 6527 (Vukina)
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 (Wossink)
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 (M. Poore)

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 (Hopkins)
Feeding calf's 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 (Washburn)
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.

Use of feed additives to reduce aflatoxin transfer to milk.
Project 6778 (L. Whitlow)
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 approaches to enhance efficiency and profitability of pork production Project 6792 (See)
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 (fact sheets 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.

Nutritional approaches to enhance swine production efficiency and profitability
Project 6777 (VanHeugten)
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 (K. Anderson)

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 (Green)

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 (J. Hinshaw)

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 (Luginbuhl)
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 (Mueller)
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.

Economics of the Soybean Complex and the Impact of Changes in Technology, Processing, Policy, and Trade
Project 6781 Piggott
New farm policy is slated to be enacted in 2007, and the current economic climate calls for significant budgetary cuts of current programs. The challenge to policy-makers is how to accomplish these budget cuts without deviating or compromising the goals of farm policy. Faculty outlined the current economic environment and farm policy as well as recommendations for policy reform in testimony before a subcommittee of the House Agricultural Committee in September 2005. This statement made the point that to be successful, U.S. farm policy should include three critical elements: (a) an economic safety net; (b) the adoption of state-of-the-art production technologies; and (c) the mitigation of the over-reliance of some agricultural commodities on government payments. Each of these elements was discussed, and empirical evidence of the state of the agricultural economy was utilized and referred to where appropriate.

Economics of adoption of agricultural technologies (Marra)
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.

Developing Strategies for Improved Pasture Fly Management
Project 6803 Watson
Faculty evaluated an experimental electric walk-through flytrap designed to reduce horn fly populations on cattle and the NZI biting fly trap designed to aid in the management of stable flies on pastures. Faculty also focused on dung beetle ecology and identified dung beetle-compatible fly management strategies. In addition to dung beetles rendering dung pats unsuitable for horn fly development, beetles also improve pasture condition and increase soil percolation and nutrient cycling.

GOAL 2 A SAFE AND SECURE FOOD AND FIBER SYSTEM

Enhancing food safety through control of food Bourne disease agents	**0295**	**Keener**
The poultry food system: A farm-to-table model	**0292**	**Sheldon**

Enhancing food safety through control of food borne disease agents (Keener)
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 2004-05, 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.

The poultry food system: A farm-to-table model (Sheldon)
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

Insect and manure management in poultry systems: Elements relative to food safety and nuisance issues	**1006**	**Watson**
Biology and control of Nuisance Vector Arthropods in NC	**6752**	**Apperson**

Insect and manure management in poultry systems: Elements relative to food safety and nuisance issues
Project 1006 Watson
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.

Biology and control of nuisance vector arthropods in North Carolina
Project 6752 (C. Apperson)
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.

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

Environmental nursery crop production	**6224**	**Bilderback**
Evaluation and modeling of riparian buffer performance in the Neuse River Basin	**6609**	**Evans**
Precision agriculture for agronomic crops and nitrogen management for corn in Eastern North Carolina	**6652**	**Crozier**
Evaluation of Tillage Practices, Organic Production, and trickle Fertigation for Nutrient Management	**6648**	**Hoyt**
Nutrient and by-product utilization and health of turkeys and broilers	**6343**	**Ferket**
Effect of management on turkey production, turkey reproduction and turkey waste handling	**6390**	**Grimes**
Improved efficiency of water reuse aquaculture systems	**3975**	**Losordo**
Bioavailability, transport and fate of contaminants in aquatic eco systems	**6509**	**Cope**
Evaluation of soil and site Evaluation BPM's for On-site Wastewater Systems in Seasonally Saturated Soils.	**6800**	**Lindbo**
Performance of on-site wastewater system and other land-based technologies for Low Impact Development (LID)	**6793**	**Hoover**

Environmentally compatible nursery crop production practices
Project 6224 (Bilderback)

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 (Evans)

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 (Crozier)

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 (Hoyt)

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 (Ferket)

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 (Grimes)
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 (Losordo)
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 (Cope)
Efforts are underway throughout the United States by a variety of state and federal agencies and academic institutions to develop and implement standardized testing procedures with native freshwater mussels so that consistent, high-quality data can be generated and used by the U.S. Environmental protection Agency to establish national water quality criteria that are protective of mussels. Recent research conducted in our laboratory and in several other laboratories from around the United States has led to the development and publication of a standard guideline for conducting toxicity tests with early life stages of freshwater mussels through the American Society for Testing and Materials. This new standard testing guideline has provided the foundation for the generation of robust toxicity information for early life stages of freshwater mussels.

Evaluation of soil and site Evaluation BPM's for On-site Wastewater Systems in Seasonally Saturated Soils. (Lindbo)
Project 6800
The current BMPs for siting on-site wastewater systems may lead to premature failure of the systems. Research showed that the current method of assessing soil wetness overestimates the depth to seasonal wetness. Seasonal wetness is a major cause of system failure, thus overestimation of its depth results in systems being installed too deep in the soil and subject to premature failure.

Performance of on-site wastewater system and other land-based technologies for Low Impact Development (LID)
Project 6793 Hoover
A study identified which specific operation and maintenance factors have significant effects on wastewater system failure rates and also showed which factors don't influence failure rates. It was clear that post-installation inspection would alleviate some of the problems observed. Also, providing long-term protection and maintenance of the location where the system was installed and the immediate area around it (site maintenance) significantly reduced failure rates and was one of the important factors that must be addressed in order to keep the system failure rates low.

GOAL 5 ENHANCED ECONOMIC OPPORTUNITY AND QUALITY OF LIFE FOR AMERICANS		
Economics of socially optimal pork production	**6706**	**Zering**

Economics of socially optimal pork production (Zering)
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 using Smith-Lever funds reported: 56

Smith Lever B & C funding Planned: 14.2% ($1,495,640)

Total Smith Lever B & C funding allocated to the 56 projects for FY 2005: $2,255,386

Certification Table and attached program descriptions follow for both Multi-state, and for Integrated Extension programs.

U.S. Department of Agriculture
Cooperative State Research, Education, and Extension Service
Supplement to the Annual Report of Accomplishments and Results
Actual Expenditures of Federal Funding for Multistate Extension and Integrated Activities
(Attach Brief Summaries)
Fiscal Year: 2005

Select One: **Interim** **X Final**

Institution: NC Cooperative Extension

State: North Carolina

		Integrated Activities (Hatch)		Multistate Extension Activities (Smith-Lever)		Integrated Activities (Smith-Lever)	
Established Target %			%	1.87	%	14.2	%
This FY Allocation (from 1088)				$10,532,678		$10,532,678	
This FY Target Amount				$196,961		$1,495,640	
Title of Planned Program Activity							
Goal 1	An Agricultural System That is Highly Competitive in the Global Economy			$228,314		$1,670,800	
Goal 2	A Safe and Secure Food and Fiber System			$49,932		$98,837	
Goal 3	A Healthy, Well-Nourished Population			$46,250		$62,688	
Goal 4	An Agricultural System That Protects Natural Resources and the Environment			$23,895		$390,894	
Goal 5	Enhanced Economic Opportunity and Quality of Life for Americans			$126,676		$32,167	
				$475,067		$2,255,386	
	Total			$10,532,678		$10,532,678	
	Carryover			$278,106		$759,746	

Certification: I certify to the best of my knowledge and belief that this report is correct and complete and that all outlays represented here accurately reflect allowable expenditures of Federal funds only in satisfying AREERA requirements.

3-24-06

Director **Date**