NORTH CAROLINA

COOPERATIVE EXTENSION

AREERA

Annual Report of Accomplishments and Results

Agricultural Research, Extension and Education Reform Act of 1998

2006

(submitted March, 2007)

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: 2006 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

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 three major focus areas of concern statewide:

- To strengthen the economy through profitable, sustainable and safe food, forest and green industry systems.
- To protect the environment and natural resources.
- To empower youth and families to lead healthier lives and become community leaders

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 four 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 8.8 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 2006 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 end of the federal tobacco program and associated buy-out of tobacco farmers means that farmers face significant challenges and choices about farming and their enterprise mix. Some growers have chosen to stay with tobacco production and others have not. Some growers have experimented with Burley tobacco in parts of North Carolina where it has not been grown previously. For others, the end of the tobacco program has meant searching for alternative enterprises.

These events, together with the low and variable profits for many other traditional enterprises, have created a sustained 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 critical. 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. Farmers seeking alternative enterprises to replace lost burley tobacco income in Western NC benefited from a Tobacco Trust Fund (TTF) grant entitled “Agriculture Options”. The TTF also funded a “Retooling for Alternative Enterprises” project at The Cooperative Extension Program to introduce the production of vegetables using black plastic and drip irrigation to limited resource and socially disadvantage farmers seeking alternative enterprises and production practices.

Corn prices increased dramatically in the latter part of 2006, driven by national policy requiring increased use of ethanol as a fuel. Higher corn prices are likely to persist, which will have a cascading effect on the

production of other crops and on livestock production costs. Energy costs remain high and have had major impacts on profitability. Extension programs sought to assist crop and livestock producers manage increased production costs through changes in production practices. Asian rust and glyphosphate-resistant weeds are two new challenges faced by NC crop producers. Campus specialists worked with county agents and producers on strategies to manage these serious problems.

Livestock generates 65% of North Carolina's gross farm income. Vertical integration or coordination through the use of contracting continues to increase in importance for commercial commodity marketing. However, direct marketing is increasing too as producers take advantage of increased consumer interest in food sources and production methods. The livestock sector continues to face uncertainty with continued concern over foreign diseases and agro-terrorism, including Avian Influenza, Bovine Spongiform Encephalopathy and Foot and Mouth Disease though there is little evidence that US customers are unduly concerned. The livestock sector of North Carolina agriculture continues to prepare response plans to cope with the new foreign animal diseases and bio-terrorism threats through continued progress on premises identification and a better understanding of the emerging National Animal Identification System program. 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. The livestock sector continues to face significant environmental regulations and Extension assists with training waste operators to assist them comply with licensing and reporting requirements.

Livestock producers received assistance with marketing and risk management strategies for beef and other traditional commodities. The Cooperative Extension Program has provided leadership in demonstrating pasture based production systems for swine, goats and poultry and assisting producers in developing marketing plans to meet increasing consumer demands for these products. 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. Pond raised prawns is a new enterprise that has generated considerable interest. Work on management of other species such as hybrid striped bass and mountain trout producers has led to economic and environmental benefits. Additional programs focused on creating value-added products.

The 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 2006, over 1000 tons of recycled poultry bedding, 10,000 tons of soybean hulls, 6000 tons of dry corn gluten feed and 8000 tons of wet corn gluten feed, and 5000 tons of other miscellaneous byproducts were utilized by clients for a realized savings of over 1 million dollars.

Interest in organic milk production continues to develop and Extension has taken a leadership role in assisting interested producers. Additional livestock marketing efforts included group marketing of traditional livestock and the development of niche and other specialty markets to take advantage of growing consumer interest. 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. The Beef Quality Assurance Program trained producers in management techniques that improve the quality of beef cattle and their market value. There was an increase in emphasis on pasture management as a tool for reducing feed costs and improving animal performance. A goat cooperative continues to develop and has provided production and management training and marketing assistance to the states rapidly growing meat goat industry. At the NC A&T SU Farm and other venues, meat goat

producers received training in the FAMANCHA method of assessing parasite load, in an effort to reduce the cost of treatment and improve profitability.

The situations in Asia and Africa regarding influenza viruses of avian origin infecting and killing people have raised awareness and concern worldwide, but especially in the U.S. Human health organizations have expressed concern that if the avian influenza virus (H5N1) develops the ability to spread from human to human, this could be the next influenza pandemic.
The great pandemic of flu in 1918 killed an estimated 20-50 million people worldwide. While there is cause for concern, the situation in Asia is very different from the situation here in the U.S. and there is certainly no cause for panic. While a new virus from Asia is a cause for concern worldwide, it is important that public health officials and the public are aware that U.S. poultry and swine are safe to consume. North Carolina ranks at the top of the list in the United States in frequency of natural disasters (especially hurricanes), and especially affecting the coastal areas of the State. The weather-related disasters of recent years have demonstrated that fact as well as to elevate the importance of animals in all aspects of society in these events. With increased concerns about pandemic diseases such as AI and man-made disasters, the need for preparation and continued bio-security is even greater. Therefore, bio-security plans for animal production farms continues to be extremely important for animal health as well as food safety. Efforts to improve bio-security across North Carolina farms represent a significant effort from researchers and educators.

Training materials were developed in both English and Spanish to address the concerns surrounding Avian Influenza. Through a series of meetings and distribution of educational materials this program has targeted Extension educators, commercial and backyard poultry growers, integrated poultry companies, farm workers, live-haul crews, the media and the general public. Over time the focus has moved from agricultural workers to media, public health decision makers, business leaders and bankers as business continuity has emerged as a crucial issue. Additionally, a K-12 public education curriculum has been developed to be launched at the State Public School Teacher's Annual Convention in November. This program has provided much needed scientific information to those most likely to be impacted by an avian influenza outbreak in North Carolina and the U.S. Over 1,000 people have been reached directly with this campaign with many others receiving reports via radio and newspaper. Maintaining a strong market for poultry products in the face of an avian influenza outbreak is crucial to the economy of North Carolina.

A new initiative sought to help farm families become more aware of estate planning tools and strategies for transferring farm assets to the next generation of farmers. Limited resource farm families received assistance from NCA&TSUs small farmer management and marketing outreach education programs.

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. 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- $7,600,003

NCCES FTEs -State 42	County - 62	Program cost- $7,194,946
NC A & T FTEs - State 2.75	County - 4.5	Program cost- $405,057

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 15,115 individuals. This total included 229 dairy producers, 5,767 beef cattle producers, 1,262 hog producers, 3,696 horse producers, 3,724sheep and goat producers, and 437 poultry producers. In total, 7,268 producers adopted best management practices that optimized income, including 163 dairy producers, 2,463 beef cattle producers, 715 hog producers, 1,488 horse producers, 2,314 sheep and goat producers, and 145 poultry producers.
The total impact of these activities was estimated to be $33,312,191, based on analysis by specialists and county agents using information sources that include interviews, surveys and secondary data.

c. State Specific

KEY THEME: Agricultural Profitability

a. Issue: 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: There were a total of 41,884 crop producers implementing a variety of specific management practices. These were 6,525 cotton producers, 11,741 grain producers, 2,872 peanut producers, 9,786 tobacco producers, and 10,960 soybean producers. These practices included improved field selection, fertilizer and pest management, business planning and risk management, and labor management. The adoption of these recommended practices contributes to improved farm productivity, profits and quality of life. Considered individually, these changes were put into practice on 7,127,720 acres of crops. The financial impact generated by all of these accomplishments is estimated to be $68,060,684.

c. State Specific

KEY THEME: Agricultural Profitability

a. Issue: Across the United States Land Grant Universities, pork producer associations and professional associations have created an abundance of valuable resources and materials for producers. However, they are not available in a consistent, easy to access system. In addition, these materials often do not directly answer the specific question or need posed by the producer. The Pork Information Gateway (PIG) was

launched at the 2006 World Pork Expo. This is a web portal of research-based and unbiased information and educational tools for the pork industry. The PIG consists of electronic publications organized as peer reviewed factsheets, frequently asked questions (FAQ), references (including books), conference proceedings and software, an image library, industry calendar of events, and a glossary. An important aspect of PIG is that each of centers interrelates. The Resource Center is the basis of the material used to develop FAQ for the answer center and each FAQ is linked to its resource for further information.
In addition, the materials in the Resource Center are the major references used in development of courses for the Learning Center to be added in 2007.

b. Impact: The Pork Information Gateway has over 600 registered users and impacts how information is delivered and technology is transferred to America's Pork Producers. Intensive marketing to producers will begin in early 2007 at state meetings. The development of the Pork Information Gateway has already brought a national focus and structure to the development and delivery of educational programs for pork producers and the enthusiastic support from the National Pork Board has provided much needed funds for the development and publication of new materials. This group has also been recognized as a Community of Practice in the extension initiative. A pilot project funded by the Golden LEAF Foundation provided the opportunity for swine producers to produce hogs on the ground and market the hogs for premium prices to the Niman Ranch Corporation, a specialty pork vendor. Growers realized a 2.5 million dollar increase in farmgate income. A collaborative effort between Duke University, the Research Triangle Institute and the A&T Cooperative Extension Program utilized a CSA (Community Supported Agriculture) model program to connect 30 participating farms with 321 participating employees in an innovative direct marketing endeavor.

c. National

KEY THEME: Agricultural Profitability

a. Issue: 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: There were 4,252 individual growers implementing various management approaches to ensure continued productivity and profits and quality of life, including 2,141 fruit growers and 2,111 vegetable producers. The practices and alternatives adopted were in production areas such as weed and disease control, tillage, soil fertility, variety selection, new marketing and risk management strategies, business planning, and labor management. Considered individually, these changes were put into practice on 80,050 acres. The financial impact generated by all of these accomplishments is estimated to be $10,515,880.

c. State Specific

KEY THEME: Organic Agriculture

a. Issue: The market for organic products continues to grow at over 20% each year. In North Carolina, organic grain is increasingly in demand. There are several large organic grain buyers operating in the state, but the lack of supply means that organic grains are being shipped in from other states. An estimated $8,000,000 worth of organic grains is imported each year—money that could enhance farmer

incomes in our state. There is a great economic opportunity for farmers in NC to transition to organic grain production, as the price premium for organic grains is 1.5 to more than two times conventional grain prices. The demand for organic livestock feed for meat and dairy production in NC is growing, increasing the demand and marketability of organic grains grown in NC. Additionally, North Carolina is in a unique position to capitalize on the expanding organic grain market due to its central location on the east coast. The North Carolina Organic Grain Project has worked with the NC Extension service and other locally-based agricultural organizations to educate farmers and Extension agents about organic grain production and marketing opportunities. The panel has an active research program to develop recommendations on cultivation practices, soil fertility and pest management.

b. Impact: Farmland in transition to becoming certified organic for grain production increased by about 90 acres since last year. Interest is continuing to increase. Six NC farmers contacted the project coordinator with interest in transitioning to organic grain production. Approximately 75 farmers, Extension agents and other stakeholders attended the two organic grain production workshops and over 230 farmers heard a presentation about organic grain production and marketing at their county extension education meetings. The faculty at North Carolina A&T participated in the authorship of a publication on Organic Grain Production in NC. Four acres at the A&T Farm are certified for organic production. Trials in 2006 demonstrated organic enterprises for NC farmers and production practices associated with sustainable, organic production systems. Trials are currently underway at the A&T Farm to investigate the opportunity to produce organic silage for the grass-based dairy operation at the Farm that will soon transition to organic.

c. Scope of Impact: State and regional.

KEY THEME: Aquaculture

a. Issue: 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 134 producers and 54 producers adopted best management practices that optimized income. The total impact of these activities was estimated to be $2,361,960.

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 adopting 9,155 alternative production, marketing and business practices. These practices impacted 133,070 acres and generated an additional $8,511,258 for these producers. Farmers markets are being incorporated in urban fringe developments and towns across North Carolina. Of the totals reported above, improved marketing practices generated almost $1.9 million in increased income. Presence of producers in multiple markets saw revenues also increase by $2.3 million. Limited Resource Farmers learned new production, management and marketing skills through various programs at NCA&TSU. The TTF Black plastic/drip irrigation project generated over 1.5 million dollars for producers experimenting with this new production technology in 1-2 acre trial plots.

c. State Specific

KEY THEME: Adding Value to New and Old Agricultural Products

a. Issue: To increase the profitability and competitiveness of North Carolina cattle producers through improved management and development of niche markets. The Beef Quality Assurance Program (BQA) trained producers in management techniques that improve the quality of beef cattle and their market value. County agents and specialists assisted producers with production, processing and marketing decisions about serving niche markets.

b. Impact: An estimated 1,500 cattle producers received BQA training and close to 700 actually enrolled in the official program. The benefits are derived from the higher value of cattle raised and sold under this program. North Carolina's population is growing and a larger segment of consumers are demanding beef that has specific attributes such as anti-biotic free, no added hormones, humanely raised, or pasture fed. NC cattle producers are responding to these market opportunities in increasing numbers. Extension is assisting with production and marketing assistance.

c. Scope of Impact: State specific

KEY THEME: Diversified/Alternative Agriculture

a. Issue: Dairy farm numbers have been decreasing for many years. The local demand for certified organic milk is strong and there is a growing market for locally produced dairy products. Producers have inquired about adding value to their farm enterprises by on-farm processing or converting to organic production. Pasture-based dairy research at the Center for Environmental Farming Systems provides knowledge about the role of pasture and the opportunities for pasture-based dairying in North Carolina.

b. Impact: There have been a number of inquiries about the possibility of organic dairy production in North Carolina and several producers have become certified or are in transition. A group of specialists and others are working to provide objective information for producers considering that option. In the past several years there have been approximately 20 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. A related effort is devoted to educating producers about the National Animal Identification System (NAIS), which is a voluntary program created by congressional mandate.

b. Impact: 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. NAIS educational programs have been conducted in many NC 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 maintain viable economic systems. 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. Additionally, lack of computer skills has impacted the farmer's capacity to market their alternative enterprise products effectively.

b. Impacts: Since completing the trainings, their confidence level has increased, attitudes changed and fears eroded. Eighteen families in two counties gained skills in developing their own web sites, Altogether, they developed thirty-six web pages, and have used those effectively to promote and sell their alternative enterprise production to local citizens. They are keeping track of farm inventory, acreages and processing spreadsheets Small farmers are also communicating with other farmers and friends via email about crops, livestock, and especially the rapidly expanding meat goat enterprises. By utilizing computer record-keeping software (provided by NCA&TSU-The Cooperative Extension Program's Farmers Adopting Computer Training) to learn and implement such skills as: 1) Setting up and keeping business records organized and separated from personal records; 2) Financial budgeting; 3) Interpreting records to

improve decision-making. Post-evaluations demonstrate that 28 participating farm businesses are using their newly learned skills to optimize decision-making and increase income by 10 percent.

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 to be 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 cost 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 education programs for each segment 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 that is 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- $4,482,225

KEY THEME: Food Safety/Food Security

a. Issue: Efficient dietary nutrient utilization, gut and skeletal health, and cost per unit of saleable product are important to the sustainability and profitability of the North Carolina poultry industry. In response to public concern for food safety, many companies are eliminating the use of antibiotic feed additives and searching for natural alternatives to control enteric pathogens that may adversely affect animal welfare and food safety. Broiler chicks and turkey poults are most susceptible to enteric disease, primarily because of compromised feed digestion and malabsorption during the first 2 weeks after hatch. Early gut health account for about 5% of the total flock mortality, and it may have lasting effects on disease resistance until the birds are harvested.

b. Impact: Several studies were completed to improve the resistance of poultry to the colonization of enteric pathogens (i.e. salmonellae) that affect bird health and increase food safety risks. Dietary soluble fiber from wheat or triticale, along with endoxylanase supplementation, was found to improve growth

performance, gut health, and discouraged Salmonella colonization in turkeys, by enhancing the diversity of the resident microflora. Dietary inclusion of whole grain or coarse ground corn at a level of 5% improved feed efficiency and early growth of broilers and turkeys, and also increased resistance to Salmonella colonization by favoring the proliferation of symbiotic enteric microflora. The potential of two antibiotic growth promoter alternatives was evaluated by several experiments aimed at improving gut health of broilers and turkeys. The effect of dietary supplementation of egg immunoglobulins (IgY) produced from hens immunized against Salmonella spp was studied on the growth and immune response of both Salmonella-challenged and unchallenged broiler chicks. Dietary IgY increased growth and meat yield of in challenged birds, and it suppressed the inflammatory response associated with enteric disease. These types of on-farm food safety intervention strategies are greatly needed in the continued battle to combat foodborne disease associated with the consumption of contaminated poultry and meat products.

c. Scope : National and International

KEY THEME: Food Safety/Food Handling

a. Issue: While our 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. 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: Extension Agents, Family and Consumer Sciences, have been meeting the needs of both small and large foodservice operations since 1996 by providing low cost, high quality training that is accessible and that can be tailored to meet specific county needs. 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 2006, 57 counties, representing all regions of North Carolina, sponsored trainings for 4,493 foodservice workers (47% managers and 53% foodservice workers). Most counties co-sponsored their training(s) with Environmental Health Specialists from their local health department. In addition to agent-sponsored trainings, three Spanish-language food safety certification programs for 40 Spanish-speaking foodservice workers were conducted. Forty percent (40%) of participants (16 of 40) passed the certification examination with a 75% or higher. Two Chinese-language food safety certification programs were also offered to 43 Chinese-speaking foodservice workers in Guilford and Wake Counties. Over 90% passed the certification examination with a 75% or higher. Extension Agents also provided training for temporary foodservice workers (83 participants); 382 child care workers representing 84 child care centers; and 616 food handlers working at 72 congregate nutrition sites. 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 best way to prevent foodborne illness in the foodservice environment.

c. Scope – State

KEY THEME: Food Safety/Food Handling

a.Issue. In the U.S., there are nearly one million foodservice establishments employing nearly thirteen million people. Foodservice is the largest private sector employer in the U.S. 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 the operation was 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 and the U.S. In most areas of the U.S., the typical training format is to: provide training materials in English; teach the class in English; administer the certification exam in one of seven languages -- Arabic, Chinese, English, French, Japanese, Korean, Spanish, and/or Vietnamese; and hope for the best. A comprehensive set of training aids is available in Spanish and in Chinese but not in the other languages. Commercial developers of training aids are believed to not prepare materials in languages other than Spanish and Chinese because the number needing the materials is small and so the effort is not viewed as profitable.

b. Impact: The Cooperative Extension Service is an excellent resource to support these small population groups. The mission of CES is to enhance the quality of life of all citizens and to not minimize access to information. Thus, a series of English-language slides (243) and fact sheets (a series of 14) were translated into Arabic are posted at:
http://www.foodsafetysite.com/foodservice/conducting/FoodserviceManager/managers.html

These materials, which are free of charge, are designed to be used in English-language food safety training classes. The materials were prepared in 2006 and will be tested in 2007 so data is not yet available about the effectiveness of using these materials on the adoption of safe food handling practices. However, it is widely accepted that increased knowledge about safe food handling is a precursor to safe food handling practices. Safe food handling is the primary way to prevent oodborne illness in the foodservice environment. These materials can also be used within the Arabic-speaking world (20 nations). Thus, the work being done in the U.S. not only benefits Arabic-speakers who live in the U.S. but this work will also benefit food industry professionals in Iraq and other Arabic-speaking nations.

c. Scope: National and International

KEY THEME: Food Safety/Food Handling

a. Issue: Foodborne illness is nearly 100% preventable if safe food handling practices are applied from the time the food is purchased until the time it is eaten. Much progress has been made to make the food we buy safer, however, once food is under the control of the consumer, if unsafe handling practices are applied foodborne illness could result. Therefore, consumer education interventions that focus on basic food safety and sanitation are needed to decrease the incidence of foodborne illness in the U.S. The focus of food safety interventions needs to expand beyond basic meal preparation and also include food preservation. While the number of individuals who preserve foods at home appears to be decreasing, the Extension Service is still the primary source of information about safe home food preservation methods. A recent home canning survey conducted by the University of Georgia found that greater adoption of science-based home canning techniques by consumers is still needed. One food safety issue that is gaining media attention is food allergies. An estimated 12 million Americans have an allergy to common

foods such as milk, eggs, peanuts, tree nuts, fish, shellfish, wheat and soy, making it a significant public health and food safety issue. To effectively reach consumers, many strategies must be used including one-on-one consultations, education workshops, and the media.

b. Impact: Each Family and Consumer Sciences (FCS) Extension Agent determines which education programs he or she will conduct based on their county needs. In 2006, 87 County Extension Centers reported conducting food safety programs for consumers. These programs ranged from basic safety and sanitation, home food preservation, to foodborne allergies. Evaluation results show that 4,275 consumers were reported to have increased their knowledge about safe food handling and 3,248 were reported to have adopted at least one food handling practice.
Helping consumers decrease the incidence of illness has the potential to decrease visits to the doctor, emergency room, and missed days at work, which can all result economic strain for families and entire communities. Several examples of these programs are described. Seasonal calls to the County Extension Center indicate a low level of knowledge about safe food preservation methods. In response, FCS Agents from several counties in western North Carolina collaborated to conduct community food safety clinics and canning workshops, participated in radio programs, and prepared news articles. Volunteers from four community clubs and one local hardware store helped the agents extend the food safety messages and reinforced the use of Extension resources for recommended practices. A second method of intervention is providing technical support to consumers by answering individual questions. While this approach reaches fewer people, it has great potential to immediately effect behavior. One Cleveland County resident contacted Cooperative Extension for information after reading the feature, "How Much Do You Know About Food Allergies?" After the FCS Agent provided tips and resources on preparing an allergen-free birthday cake for her son's first birthday, the mother reported that her son enjoyed the birthday cake without any symptoms of an allergic reaction. The caller expressed her appreciation for the invaluable educational resources provided to her and her family in managing a potentially life threatening condition. Another example of the importance of individual contacts occurred during the large multi-state outbreak caused by *E. coli*. The Food and Drug Administration advised consumers to not eat any fresh bagged spinach. The FCS Agent in Dare County received a call from a citizen who had prepared spinach lasagna to serve at a wedding during the time of the outbreak and wanted to know if it was safe to serve to guests at the wedding. The Agent explained the proper cooking and food safety procedures to follow to ensure that the *E. coli* bacteria would be killed. As a result, the lasagna was safely served at the event.

c. Scope – State Specific

KEY THEME: HACCP/Food Handling

a. Issue: Serving safe food is a key responsibility of school foodservice and a key aspect of a healthy school environment. Keeping foods safe is also a vital part of healthy eating and is one of the recommendations of the Dietary Guidelines for Americans 2005. By July 1, 2006, USDA required that in order for a school district to receive federal funds, each school in the district must have in place a food safety plan based on process HACCP principles. It is widely believed that when properly implemented, HACCP-based food safety programs will help ensure the safety of school meals served across North Carolina as well as the U.S.

b. Impact**:** To help North Carolina schools meet this mandate, the Child Nutrition Services Section at the NC Department of Public Instruction (DPI) contracted with Dr. Angela Fraser at NC State University/NC Cooperative Extension. During 2005-2006 an Extension specialist developed a standardized HACCP Plan that could be used by all schools in North Carolina. The plan is posted at: http://www.foodsafetysite.com/foodservice/conducting/ChildNutrition/overview Dr. Fraser also trained

DPI consultants, Child Nutrition Directors (CNDs), and 33 Extension Agents about how to implement the HACCP Plan in schools. The 33 Extension Agents who were trained conducted four-hour training sessions for school site managers in nearly every school district in North Carolina. The formal implementation of the HACCP Plan began in schools in August 2006. Continued technical and training support is also needed to ensure the effective implementation of the HACCP Plan. It is not enough to provide a Plan, the Plan must be continuously monitored and supported to be sure that it works. In 2006, a Frequently Asked Questions (FAQs) database was added to the School HACCP component of the website -- http://www.foodsafetysite.com/foodservice/conducting/ChildNutrition/SchoolHACCP/FAQs. To date 50 FAQs have been added. In 2006, Extension Agents trained nearly 1200 site managers at schools across North Carolina. Because the HACCP Plan was introduced in summer 2006 and implementation began in August 2006, data has not been collected to determine the effectiveness of the HACCP Plan. However, it is believed that providing guidelines about what, why, and how to monitor critical control points in a school environment will lead to the production and service of safer food.

c. Scope -- State Specific

KEY THEME: HACCP

a. Issue: The International Standards Organization (ISO) published a new standard in 2005 (ISO 22000) to address specifically the requirements for any organization in the food chain with respect to food safety management systems. ISO 22000 combines the system management and continual improvement elements of the widely recognized ISO 9001 standard for quality with the principles of HACCP (Hazard Analysis and Critical Control Points) and application steps developed by the Codex Alimentarius Commission. A large poultry processor in the State of North Carolina is seeking comprehensive assistance with their implementation program in order to achieve certification and improve their operations in terms of food safety management and regulatory compliance. NCSU has had vast experience supporting ISO 9001 certification for manufacturing companies in non-food related sectors via the Industrial Extension Service (IES). However, IES has not had previous experience with food processing companies, particularly in matters regarding food safety management systems. Therefore, collaboration with faculty in the Department of Food Science is required for the successful execution of this project.

b. Impact: Extension specialists from IES and the Department of Food Science - Cooperative Extension Service (CES) at North Carolina State University have formed an interdisciplinary team to fulfill the needs of this processor regarding the ISO 22000 certification. If the project reaches a successful end (certification is estimated to happen towards the end of 2007), this would be the first food processor in the State of North Carolina to get the ISO 22000 certification, and possibly the only poultry processor in the country to achieve such certification. Successful and synergistic collaboration between CES and IES would also mark an important milestone in the way of working of the extension program at NCSU.

c. Scope: State, National and International

KEY THEME: Food Resource Management

a. Issue: North Carolina seafood processors are positioned to exploit niche markets. Surveys show that consumers prefer locally harvested and processed seafood - and are willing to pay a premium price for novel, healthy products and convenience.

b. Impact: Since 2001, the Seafood Laboratory has assisted six North Carolina businesses commercialize 30 of 54 value-added products. Several coastal processors are beginning to evolve from commodity-oriented to consumer-driven businesses as they expand into value-added seafood. With education and technical assistance, our seafood industry has begun to harness functional food ingredients and innovative processing methods to better compete in retail and wholesale markets. Seafood safety education continues to make the seafood industry and restaurant employees much more aware of the hazards associated with seafood and of the handling procedures that enhance the wholesomeness of fishery products.

a. Scope: Regional

KEY THEME: Food Resource Management

a. Issue: The Department frequently receives direct inquiries or referrals of about 180 persons per year who are trying to develop their own food business.

b. Impact: We have developed a comprehensive program to assist these entrepreneurs, by working with organizations such as the NC Specialty Products Association, coordinating with the regulatory agencies, testing products and providing services such as label assistance and process recommendations. A web site and short courses have been produced to guide them and provide various resources to them. A special emphasis has been placed on pairing up with the Blue Ridge Food Ventures shared use processing facility in Asheville to encourage entrepreneurs to use this facility for initial efforts where they can learn Good Manufacturing Practices, such as sanitation and safety, as well as equipment use and maintenance.

c. Scope: State

KEY THEME: Food Security

a. Issue: Avian Influenza is in the news. The situations in Asia and Africa regarding influenza viruses of avian origin infecting and killing people have raised awareness and concern worldwide, but especially in the U.S. Human health organizations have expressed concern that if the avian influenza virus (H5N1) develops the ability to spread from human to human, this could be the next influenza pandemic. The great pandemic of flu in 1918 killed an estimated 20-50 million people worldwide. While there is cause for concern, the situation in Asia is very different from the situation here in the U.S. and there is certainly no cause for panic. While a new virus from Asia is a cause for concern worldwide, it is important that public health officials and the public are aware that U.S. poultry and swine are safe to consume.

b. Impact: Training materials were developed in both English and Spanish to address the concerns surrounding Avian Influenza. Through a series of meetings and distribution of educational materials this program has targeted Extension educators, commercial and backyard poultry growers, integrated poultry companies, farm workers, live-haul crews, the media and the general public. The program addressed 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 if the virus is found in poultry and potential consequences associated with isolation of H5N1 in the U.S. or in North Carolina. Over time the focus has moved from agricultural workers to media, public health decision makers, business leaders and bankers as business continuity has emerged as a crucial issue. Additionally, a K-12 public education curriculum has been developed to be launched at the State Public School Teacher's Annual Convention in November. This program has provided much needed scientific information to those most likely to be impacted by an avian influenza outbreak in North Carolina and the U.S. Over 1,000 people have been

reached directly with this campaign with many others receiving reports via radio and newspaper. As teachers incorporate these training materials in the classroom many additional young people will be able to communicate risk to their parents. A major goal has been to provide timely information that can be used to recognize problems and make sound decisions related to the true risk and the continued safety of poultry and swine products. Maintaining a strong market for poultry products in the face of an avian influenza outbreak is crucial to the economy of North Carolina.

c. Scope: National and State specific

GOAL 3. A HEALTHY, WELL-NOURISHED POPULATION

Overview

The importance of promoting nutrition and wellness throughout life has been clearly established. Two major scientific reviews, the "Surgeon General's Report on Nutrition and Health" and "Diet and Health" by the National Research Council have documented several diet and chronic disease relationships and have recommended some dietary changes for the public. The Public Health Service "Year 2010 Objectives For the Nation" has also noted the major role that nutrition plays in health promotion and disease prevention. 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 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 overweight 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 38,000 participants increased knowledge that will promote a healthier diet; many more were reached using mass media techniques such as newspaper, radio and television. Over 38,000 gained in knowledge concerning reducing risk for chronic disease, over 13,000 participants adopted behaviors consistent with decreasing the risk of chronic disease. Over 2,800 child care providers gained knowledge about the importance of good nutrition for the children in their care. As a result, over 20,000 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- $1,676,037
NCCES state FTEs – 6.5	County FTEs- 21	Program cost- $1,604,415
NC A & T state FTEs –1.0	County FTEs -.75	Program cost- $71,622

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 1,365
Number of participants making one or more positive dietary change 13,179
Numbers of participants increasing knowledge that will promote a healthier diet 38,803
Numbers of participants increasing skills that will promote a healthier diet 26,070

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 33,852
Number of participants who adopt one or more behaviors consistent with decreasing the risk of chronic disease 13,179
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 152
- Numbers who decrease excess weight 514
- Numbers who increase physical activity 5,107

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 1,900 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 14,000 preschool children were observed to improve eating patterns including more willing to try new foods. Also, over 14,000 preschool children were observed to improve physical activity patterns. Note: Color Me Healthy in an ongoing program, these numbers are for 2006 only.

SyberShop continues to be used across the state. Approximately 200 middle and high school teachers were trained to use SyberShop in the classroom. 3,207 teens increased knowledge and 2,572 adopted at least one positive health behavior as a result of using this multimedia CD. Note: SyberShop was not available for much of 2005 due to the CD being updated for subject matter content.

b. 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 4,323
Number who showed improvement in one or more food safety practice 2,121
Number who showed improvement in one or more nutrition practice 9,835

c. Scope: State specific

KEY THEME: Human Health

a. Issue: The situations in Asia and Africa regarding influenza viruses of avian origin infecting and killing people have raised awareness and concern worldwide, but especially in the U.S. Human health organizations have expressed concern that if the avian influenza virus (H5N1) develops the ability to spread from human to human, this could be the next influenza pandemic. The great pandemic of flu in 1918 killed an estimated 20-50 million people worldwide. While there is cause for concern, the situation in Asia is very different from the situation here in the U.S. and there is certainly no cause for panic. While a new virus from Asia is a cause for concern worldwide, it is important that public health officials and the public are aware that U.S. poultry and swine are safe to consume.

Training materials were developed in both English and Spanish to address the concerns surrounding Avian Influenza. Through a series of meetings and distribution of educational materials this program has targeted Extension educators, commercial and backyard poultry growers, integrated poultry companies, farm workers, live-haul crews, the media and the general public. The program addressed 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 if the virus is found in poultry and potential consequences associated with isolation of H5N1 in the U.S. or in North Carolina. Over time the focus has moved from agricultural workers to media, public health decision makers, business leaders and bankers as business continuity has emerged as a crucial issue. Additionally, a K-12 public education curriculum has been developed to be launched at the State Public School Teacher's Annual Convention in November.

b. Impact: This program has provided much needed scientific information to those most likely to be impacted by an avian influenza outbreak in North Carolina and the U.S. Over 1,000 people have been reached directly with this campaign with many others receiving reports via radio and newspaper. As teachers incorporate our training material in the classroom many additional young people will be able to communicate risk to their parents. A major goal has been to provide timely information that can be used to recognize problems and make sound decisions related to the true risk and the continued safety of poultry and swine products.

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 to address the new regulations and issues. Examples include trainings and extension fact sheets on sludge surveys of waste treatment lagoons, and 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

All estimates of economic impact (e.g. dollars saved) in the impact sections below, are based on surveys, observations and analysis performed by field agents.

Courses for animal waste and wastewater system operators were offered at the Lake Wheeler Land Application Training and Demonstration. Wastewater system operators have been able to obtain education and training to obtain or retain operator's licenses. Certified crop advisors have also received CCUs through these courses. Education and training has helped operators keep in compliance with regulations and maintain environmental quality while ensuring that animal production systems or industrial processes continue.

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 $5,882,496
NCCES FTEs -State 31	County - 58	Program cost- $5,803,887
NC A & T FTEs - State .85	County - .75	Program cost- $78,609

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. There are over 2,500 animal facilities in North Carolina, and about 3,000 operators of animal waste systems. 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. In addition Phosphorus loading is becoming an issue on lands receiving animal waste, especially those receiving poultry litter.

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.). A phosphorus loss assessment tool (PLAT) has been developed and implemented jointly with NCDA and NCDENR to help producers identify BMPs to reduce phosphorus transport from land application fields.

b. Impact: In 2006, the number of producers utilizing approved waste management plans numbered 3,992 and the number of farms adopting waste management-related BMPs totaled 300. This translates directly into improved water quality, due to proper waste application, and adoption of BMPs (both structural and managerial) to prevent nutrient movement to waterways.

These impacts were achieved, in part, by training leading to the certification or maintenance of certification of 3,096 operators of land application systems, and soil and waste analysis on about 571,104 and 307,762 acres respectively.

c. Scope: State Specific

KEY THEME: Soil Erosion

a. Issue: Soil erosion continues to be a major concern in North Carolina, since it has both on-site impacts (loss of fertility, gullying, disruption of normal tillage operations) and off-site impacts (loss of aquatic habitat, pesticide and nutrient pollution, and sedimentation in sensitive areas). 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. Training is provided on software that predicts soil erosion losses and evaluates the impact of several BMPs on soil erosion.

b. Impact: In 2006, soil erosion was reduced by 94,234 tons due to adoption of soil erosion related BMPs. In addition, an estimated 199,240 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. Nutrient management classes are offered to growers, certified crop advisors and state agency personnel. 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 88,505 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. The Small Farm Program at NC A&T State University through its outreach efforts at the NC A&T Farm and The Center for Environmental Farming Systems collaborated with environmentally focused community partners. They introduced and enhanced sustainable agricultural practices and marketing solutions to over 1,500 limited resource, socially disadvantaged, beginning and other small scale growers.

b. Impact: A total of 21,384 people, particularly youth, were made aware of the link between agriculture and the environment, while 340 people increased there participation in policy making. In addition, 342 people adopted practices to promote sustainable ecosystems. Over 4,000 youth participated in agriculture literacy programs at the NC A&T State University Farm. They learned about environmentally sustainable agriculture and engaged in hands-on activities that enhance the science and math skills that build upon the standard course of study in NC public schools.

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, for the second year in a row, 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 about 68,000 pounds (expressed as active ingredient) in 2006, saving producers about $1.1 million in chemical costs alone. This in part was

achieved through the use of integrated pest management on almost 400,000 acres with biological control implemented on just over 100,000 acres. In addition, nearly 4,700 people in the green industry (greenhouse, fruits and vegetables, and turf and landscape) used integrated pest management.

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 is in use 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 1,000 North Carolina solid waste managers and citizens reported the use of composting (including vermicomposting) in 2006.

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 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 and loss of land, increased transport of nutrients to streams and

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 and consumer safety, maintain or improve crop yields and beneficial insect populations, and address other environmental protection issues. To become certified, participants must pass a multiple choice exam administered by NCDA&CS. To maintain certified 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. A five-day course on emergency management of pesticide incidents was offered to managers of state regulatory compliance programs in an effort to improve coordination and protect public safety and environmental quality.

b. Impact: Of the 25,905 private pesticide applicators (farmers who use restricted-use pesticides and are required to re-certify every three years) and 12,216 commercial applicators (required to re-certify every 2 or 5 years depending upon category) in North Carolina, 4,965 were newly certified in 2005 and 17,183 were recertified by attending CES training programs. The number of people adopting one or more BMPs related to pesticide usage numbered 8,066 in 2006, and these BMPs were applied to 260,149 acres. Moreover, through the effective training and advertising of the pesticide container recycling program, 142,491 pesticide containers were recycled thus preventing them from ending up in community landfills and saving about $480,000 in disposal costs. The estimated reduction in production costs from proper use of pesticides totaled $3.08 million.

c. Scope: State Specific

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

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

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 8.8 million in 2006. 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, it is estimated that the Hispanic population of North Carolina grew by 425 percent, compared to 130 percent increase for Asians, 26 percent for African-Americans, and 23 percent for whites over the sixteen year period. 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. Today, the proportion of North Carolina's population who are seniors (age 65 or older) is roughly 12 percent. The financial well being of the citizenry also varies widely from the most rural areas to the high tech region of Research Triangle Park. North Carolina has a wide range of industries contributing to the general economy ranging from the fisheries on the coast, the christmas tree industry in the mountains, the furniture manufacturing industry in the Piedmont to the farming industry that spans from the Mountains to the coast. 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 $8,233,851
NCCES FTEs -State 19	County - 130	Program cost- $7,974,962
NC A & T FTEs - State 2	County - 4	Program cost- $258,889

Key Theme Aging / Estate Planning / Retirement Planning

a. Issue: Many families struggle with managing financial debt and request assistance in acquiring new skills, adopting sound financial management practices, and developing personal and professional financial management habits that will make later years more financially secure. There were 62 extension units who reported efforts to assist participants increase their financial management

awareness and expand their skills concerning financial planning, estate planning for individuals as well as family-owned businesses, and retirement planning.

b. Impacts: In 2006 there was a mixed response by North Carolinians concerning their desire to develop new and/or additional skills and strategies to manage their personal finances and plan their financial future. For example, there was a slight decline in attendance at estate planning workshops relative to 2005 because in 2005 passage of the national tobacco buyout legislation motivated many families to think about future financial plans. For 2006, a similar financial planning incentive did not exist. Alternately, there were 935 individuals who reported improved money management skills including implementation of a savings plan to increase their financial security in later years. There were also 1,937 participants who reported improved financial practices and knowledge gained through attendance at financial management sessions. Also, 804 individuals reported lifestyle changes that improved their financial status. Individuals estimated that the amount of debt reduced was $137,043. Estate planning programs were conducted in twelve 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 93 limited resource (LR) and 633 non-limited resource (NLR) increased their knowledge about estate planning and an additional 618 people reported that they had increased their knowledge about the need to prepare for possible mental incompetency. As a result of programs, an additional 173 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 162 individuals reported executing legal documents to prepare for future incompetency and dependency. Finally, 684 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 forty-four counties initiated efforts to: (1) increase citizen awareness of economic trends that affect local economies; (2) increase audience's capabilities and skills to participate in community development efforts; and (3) allow citizens to become better informed about implementing sustainable economic development programs. Local officials in thirteen counties reported on efforts that encouraged development of home based business plans, encouraged new business start up enterprises, and actively participated in community economic development programs. Economic development programs provided one means that allowed local officials to become more aware of, better informed about, and more involved with community growth and change issues concerning land use, community infrastructure, and organizational leadership.

b. Impacts: In 2006, 1,590 communities engaged in community visioning, planning, and devising constructive solutions to community development problem solving. There were 821 people who reported that they increased their knowledge of economic development principles. The number of communities involved in community enhancement and revitalization efforts equaled 433. Communities reported that they saved $358,951 as a result of achieving successful resolution of community issues. Eighty-five businesses were retained or saved as a result of economic development programs and $860,000 in revenue was retained by local communities. During 2006 1,333 new jobs were created and 38 existing businesses expanded. There were 66 non-limited and limited resource new marketing

venues established or sustained in 2006 that resulted in $81,601 in additional income generated. Business expansion resulted in an additional $224,200 in added funds available locally.

c. Scope: State Specific

Key Theme--Community Development (limited resource and nontraditional audiences)

a. Issue: Citizens from varying socio-economic levels gained skills and acquired knowledge that facilitated community problem solving. NC A&T led program efforts that helped rural communities who are increasingly expected to design more local solutions to problems and issues. There were 467 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, 365 limited resource people were able to develop and implement action plans that resolved community problems. One hundred and twenty-six people who developed action plans identified themselves as limited resource participants while 239 people were non-traditional participants. A total of 107 community issues were resolved or completed.

b Impacts: A total of 446 limited resource and non-traditional individuals increased their capacity to provide service to the community. Successful resolution of community issues resulted in $668,230 in additional savings available to local communities. To continue finding solutions to problems, individuals formed 46 new community organizations.

c. Scope: State Specific

Key Theme-Family Resource Management

a. Issue: A total of sixty-two 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 14,120 and the number of people who actually developed a money management plan was reported to be 1,400. An additional 2,066 people wrote down financial goals while another 7,759 individuals also developed debt management plans during 2006. A total of 804 reported a lifestyle change to improve their financial status. There were 1,937 individuals who reported improved financial status due to adoption of practices and skills learned in workshops. There were 402 individuals who reduced debt loads by a reported amount of $137,043. Participants estimated savings totaled $29,430.

c. Scope: State Specific

KEY THEME: Child Care

a. Issue: Available and quality afterschool 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 afterschool care. State and county 4-H programs contributed to a dramatic increase in afterschool capacity in the past decade. However, increasing demands by all families and declining subsidies for limited resource families mean that quality afterschool care is unavailable to many North Carolina 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 professionals 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

- 74 new school age care programs were started
- 913 additional spaces were made available for youth in school age care programs
- 313 collaborations were sustained to support families
- 53 new collaborations were developed to support families

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

- 682 4-H youth volunteers (including 315 from limited resource backgrounds) served in expanded and/or additional volunteer roles in 4-H
- 906 4-H adult volunteers (including 252 from limited resource backgrounds) served in expanded and/or additional volunteer roles

- 938 4-H youth volunteers (including 623 from limited resource backgrounds) served in expanded and/or additional volunteer roles in their communities

- 1,005 adult volunteers (including 440 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 skill, 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

- 5,641 youth increased decision making skills in asset development programs

- 1,625 youth increased decision making skills in asset development programs

- 2,672 youth increased participation in community service programs

- 3,040 youth reduced negative risk taking behaviors

- 1,786 youth reduced judicial involvement

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 Wide Web, 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 2006, 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 2006, a total of 40,863 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: 22,054 youth have increased their decision making skills; 36,086 increased their communication and interpersonal skills; 20,949 increased their knowledge of community service

opportunities; 20,644 increased self-confidence; and 24,187 increased their competency in managing relationships.

b. Impacts

- Increased communication skills 36,086
- Increased leadership skills 13,510
- Increased awareness of community services 20,949
- Increased decision making skills 20,054
- Saved their communities $558,350 through community service projects/volunteerism
- Earned $543,572 as a result of their 4-H project work
- 7,000 volunteers worked with young people in 4-H clubs during 2006. Their combined efforts total 123,562 hours for a value of $2,229,058. On average, volunteers committed 10 hours to their local 4-H club program.

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 2007. 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 2003 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 and 2006 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 2006, NCCES had documented multistate activities using Smith-Lever B & C funds amounting to $651,808. This funding level exceeded the originally planned expenditure of $195,455 by $456,353. Altogether, the 2000 plan indicated 12 activities. Additional activities have been added for a total of 21 currently underway for 2006.

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.

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, 52 had significant Smith-Lever B & C funding allocated for all or part of the Extension funding in 2006. For fiscal year 2006, these B & C funds amounted to $2,284,426. This funding level continued to exceed the originally planned expenditures for Integrated projects that has occurred over the span of the planning cycle. For 2006, the original plan called for an expenditure of 14.2%, or a total of $1,484,205. The actual expenditure exceeded the plan by $800,221.

While the integrated projects have a greater focus on Goals 1 and 4, some projects are reported under Goals 2 and 5 as well. One project is 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-15

Competitiveness and Sustainability of the Southern Dairy Industry

Amount Funded: $ 6,997

Report: This SERA is scheduled to run through 9/08. A major activity of the SERA in 2006 was planning and conducting the Southern Dairy Conference held in Atlanta in February, 2006. 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 develop regional collaborations in program planning and delivery, and to assess staffing trends and needs in support of the 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: $ 19,199

Report: This program is evaluating new apple cultivars with respect to their suitability for the southeast region. Larger field plantings have been made of six promising new cultivars to emerge from the NE 183 Regional Apple Cultivar Program in order to develop best management practice recommendations for producers. On-farm studies were 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. New technology for reduced drift from pesticide application in orchards is being evaluated that compares pesticide drift and biological efficacy with currently available methods. 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. Presentations were made to apple producers at the State and County level to educate growers on current developments in orchard management practices. 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: $59,896

Report: In 2006, the NCCES program specialist in strawberries provided 9 out-of-state Strawberry plasticulture Workshops and Agent In-Service Trainings in Virginia (3), Georgia (2), South Carolina (2), and Arkansas (2). There were more than 500 producers and agents directly impacted by those meetings in these other states. The program specialist continues to act as mentor for two new small fruit extension specialist in Virginia, Dr. Jeremy Pattison, VA Tech – Blackstone. A CUE application for methyl bromide for 2008 was submitted to US-EPA for a Southeastern Strawberry Consortium of 14 states in July 2006. A regional strawberry plasticulture program will again be conducted for new growers in Sunset Beach, North Carolina, as part of the Southeastern Strawberry Expo (11.09.06). The specialist also wrote a chapter for the 2006 Midwest Strawberry Production Guide, The Ohio State University Extension, Bulletin 926, "Chapter 10 – Plasticulture in the Midwest" pp 100-118.
The specialist in strawberries also provided leadership to the development of two critical documents that appear on the website of the multi-state Southern Region Small Fruit Consortium:

2006 Southeast Regional Strawberry Integrated Management Guide (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.

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: $28,670

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 a 2 day workshop is held for specialists from these states and KY, LA, TN and FL to share recommendations, research results and cooperate in program planning.

Program 5.

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: $36,682

Report: The Pork Information Gateway was launched in June 2006. This electronic resource includes 200 peer-reviewed "best of the best" publications in 16 topic areas related to pork production. In addition, PIG includes a database of over 2000 frequently asked questions, 1200 reference publication, an image library, a glossary of pork industry terms and a calendar of upcoming events. 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 6.

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: $34,560

Report: Over 2,500 production management curriculums covering 18 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 7.

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: $7,900

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

Program 8.

Southeastern Dairy Youth Retreat, 4-H Youth Dairy Judging, 4-H Youth Quiz Bowl and National 4-H Dairy Conference

Amount Funded: $41,540

Southeastern U.S. Dairy Youth Retreat:

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.

Report: Thirty-six (36) youth and ten (10) adults from North Carolina participated in the 2005 Southeastern U.S. Dairy Youth Retreat that was held in North Carolina. In addition, 32 youth and 11 adults from South Carolina, Georgia and Florida participated in this annual educational retreat for a total of 79 participants. Through educational workshops, youth increased their knowledge of the dairy industry in the Southeastern U.S.

4-H Dairy Cattle Judging:

Report: 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, (4 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).

4-H Dairy Quiz Bowl Team:

Report: The North Carolina 4-H Dairy Quiz Bowl Team (4 youth) competed in the North American 4-H Quiz Bowl Contest held in Louisville, KY.

National 4-H Dairy Conference:

Report: North Carolina had 2 youth delegates and 2 adults participate in the National 4-H Dairy Conference held at the University of Wisconsin-Madison.

Program 9.

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.

Amount Funded: $22,588

Report: An in-service training on pasture-based and organic dairy farming was held in VA for 30 dairy agents and other dairy professionals from TN, VA, and NC in June, 2006. Similarly, information on the project was shared in a one-day session to another group of 25 NRCS workers from around the nation plus 3 extension agents from NC. Information from our dairy grazing work was also shared at 4 producer meetings in NC, the Southern Dairy Conference in Atlanta, Ga, and 1 meeting in West Virginia as part of programs designed to investigate possibilities for organic dairy production in the southeastern US. Information on reproduction of cattle in the project was presented at the national meeting for the American Society of Animal Science and the American Dairy Science Association in Minneapolis, MN. The regional project hosted the 6th Mid-Atlantic Dairy Grazing Conference at CEFS in Goldsboro, NC on October 31-November 1, 2006 with about 130 participants from OR, MS, IN, WI, NY, PA, GA, TN, NE, MN, KY, VA, WV, USDA, as well as NC. A conference proceedings was made available in paper or CD format. Other groups were hosted for tours of the pasture-based dairy work in progress.

Goal 2. A SAFE AND SECURE FOOD AND FIBER SYSTEM

Program 1.

The Poultry Food System: A Farm to Table Model

The intent of this multistate regional research project is to efficiently use the capabilities of the university and USDA Agricultural Research Service cooperators and their respective facilities to achieve the project objectives that address current regional and national priorities of improving consumer food safety and product acceptance, and the commercial profitability of poultry meat and eggs by solving critical problems related to the quality of poultry meat and eggs; specifically color, flavor, or texture of the product, and the safety of poultry meat and eggs; specifically pathogen colonization, contamination, decontamination. Thirteen states plus researchers from USDA Agricultural Research Service laboratories and one Canadian university participate on this project.

Amount Funded: $52,410

Report: To improve consumer safety, acceptance, and the commercial profitability of poultry meat and eggs, NCCES investigators have been collaborating with investigators from thirteen states, USDA/ARS Laboratories and a Canadian University. The collaborative study with colleagues at Ohio State University has continued to address the relationship of animal production/waste management practices and nutritional interventions to the fate of bacterial and viral pathogens that pose a potential risk to humans. Our most recent studies have centered on the impact of nutritional strategies and in particular grain particle size and insoluble fiber on their ability to modulate the gastrointestinal tract microflora and

in particular Salmonella. Other studies have centered on alternative housing systems such as the caged broiler system for reducing the level of microbial contamination on broilers. Nutrition and dietary components potentially affecting the production, frequency, and fate of pathogens in excreta and following treatment and land application are also being investigated.

The information gained from these studies can be a useful tool for developing new and effective control strategies for reducing pre-harvest Salmonella contamination populations through a multiple step intervention program that includes dietary changes and changes in housing design. When pathogen populations are reduced during the pre-harvest phase of production, food borne pathogen prevalence and populations entering processing plants or the environment should also be minimized, thus reducing their subsequent transmission risk to humans and other animals.

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 developed in North Carolina and shared with other states in a collaborative arrangement for updating and dissemination.

Amount Funded: $24,500

Report: NCCES has maintained a relationship with other states (such as the University of Georgia at Athens and Kansas State University) with whom we have shared the Partners in Wellness program curricula in the past and, in turn, have co-written papers for publication on older adults nutrition education. We continue to collaborate with states via discussions at meetings, and co-authoring papers. Although funding ended in 2004, the PIW program continues to be delivered across North Carolina.
This past year the curriculum was shared with the University of Florida and other states in the southern region to be used as a model for development of disaster nutrition education materials for older adults.
A 3-day meeting of all the partners took place to discuss goals, development, and implementation for future national dissemination. I am also working with a group of state specialists on a Family Caregiver Cooperative Extension program and am using my PIW nutrition information as I lead the nutrition component.

Program 2.

Elderly Nutrition Extension

Elderly Nutrition Extension (ENE) Core Group has transitioned into 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 focuses on bringing to light information and assistance to improve the attention to older adult nutrition issues.

The Healthy Aging Division is 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. I have been invited to speak at the annual meeting concerning my work with older adult nutrition education.

Amount Funded: $29,747

Report: NCCES faculty co-chaired the Aging Subcommittee this past year. We dealt with keeping abreast of national nutrition policy regarding older Americans.

Program 3.

SERA-IEG 19

Identifies and addresses health issues within the Southern Region, Puerto Rico and Virgin Islands.

Amount Funded: $1,391

Report: This SERA is scheduled to continue through 2010. The major activity of this SERA has been planning and conducting the Southern Region Extension Health Institutes, publications, curriculum and journal articles. This SERA is also involved in the planning of the annual Priester National Extension Health Conference. SERA regional meetings are held twice a year and coordinated by the Southern Rural Development Center at Mississippi State University. Participating states are North Carolina, Kentucky, Tennessee, South Carolina, Georgia, Mississippi, Alabama, Florida, Louisiana, Texas, New Mexico, Arkansas, Oklahoma, Puerto Rico and Virgin Islands.

Program: 4.

Environmental Health

Environmental health and housing education for children and consumers, this program involves North Carolina and other states in a collaborative arrangement for program and resource development and provide workshops, agent training and resources throughout the Southern Region and nationally.

Amount Funded: $18,000

The Healthy Indoor Air for America's Homes and Children's Environmental Health Partnership have been instrumental in the development of a network within the eight southern states, Puerto Rico and Virgin Islands and nationally to plan and develop curricula, program delivery strategies and expertise in environmental health programs. Monies have been awarded to North Carolina and with the collaboration of other states to develop and maintain a national website focusing on children's environmental health issues, resources, FAQs and links.

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: $13,145

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: $13,101

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: $18,666

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. Our direct involvement in the Rural Community College Initiative of SRDC involved liaison with and coaching Piedmont Community College in rural development and entrepreneurial initiatives.

Program 2.

4-H Volunteer Leadership Development Forum

A multistate program designed to train more effective leaders for youth programs.

Amount funded: $53,597

North Carolina 4-H staff served in an advisory capacity for the 2006 fiscal year on the Regional Planning Committee.
In this capacity, electronic files were shared, multiple teleconferences were held and additional correspondence was required. Some assistance with teaching materials and resources for workshops, particularly those conducted by volunteers, is provided through the state 4-H staff. The 2006 delegation consisted of 69 North Carolina 4-H staff and volunteers with a total of 14 of the 80 workshops provided by North Carolina participants, including 3 sessions presented and/or led by the NC volunteer specialist.

Other multi-state participation includes service 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. The upcoming biennial conference is scheduled for April 2007 in Junction City, Kansas. One of the concurrent workshop sessions will be conducted by the NC volunteer specialist.

Program 3.

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

Amount Funded: $52,391

The Children, Youth and Families Extension network is funded by ES-USDA. NCCES faculty serves on the national CYFERnet Parent/Family Editorial Board. Editorial Board members solicit, review and post new resources for CYFERnet from various land-grant universities via follow-up of both CYFAR 2005 and 2006 conference presenters and participants, web searches, contact with authors, and CYFERnet on-line submissions. A total of 1,316 resources were reviewed during the past year.996 of these resources were accepted and posted to the web site for a 76% acceptance rate. There are approximately 7,700 total resources in the CYFERnet database.

The Parent/Family board focused on addressing and filling categories with less than 20 resources. These include: sibling relationships, conflict resolution, elder abuse, teen maltreatment, employment skills, insurance, bi-racial/ multiethnic families, singlehood, teen parent families, and same-sex relationships.

The Parent/Family board developed a resource called the “Emergency Toolkit: Helping Families in Times of Stress” to help parent educators respond to families during times of stress. This toolkit was posted to CYFERnet (http://www.ces.ncsu.edu/depts/fcs/human/disaster/kit.php)

Program 4.

Extension Continuing Professional Education Portal (CECP)

The ongoing multi state project is called the Cooperative Extension Continuing Professional Education Portal (CECP for short). This is an effort to provide 4-H professionals across the county a means to strengthen their knowledge about 4-H PRKC.

Amount Funded: $35,549

Report: The web based portal system allows 4-H professionals to enter and take on line classes on PRKC areas (my area is Equity, Access and Opportunity / Diversity). Currently, we have approximately 10 states working on this project. The web portal system is now live and 4-H professionals are taking classes.

Program 5.

National 4-H Cooperative Curriculum System

This system is comprised of 46 member states which has the purpose of developing design and content valid curricula to the 4-H audience nationwide.

Amount Funded: $71,279

Report: This system during the past year has produced 27 publications this past year. Fifteen of them are new. Afterschool Agriculture, Changing Spaces, Computer, Geospatial, Making Youth Organizations Work, and Robotics. Twelve of them are revisions and include Bicycle, Dairy Goat, Moving Ahead, and Sheep.

Summary:

Total Extension Multistate Programs listed: 21 total
Total Smith Lever B & C funding planned: $195,455
Total Smith Lever B & C funding allocated to 21 programs for FY 2006: $651,808

F. Integrated Research and Extension Activities

The following is the project/program names and brief descriptions of the NCCES Integrated Extension-Research programs receiving support from Smith-Lever funds, broken out by the respective Goal.

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

Integrated Project	Project #	Name
Orchard Systems and Production for a Successful Apple Industry	6758	McArtney
Small fruit diseases and their control	6747	Cline
Disease Management of Ornamentals in Greenhouses and Nursery Crop Production	6683	Warfield
Production Strategies For Improved Vegetable Production and Alternative Crops For Diversification	6596	Schultheis
Weed management for small fruits and vegetables	6735	Monks
Evaluation of Managed and Unmanaged Plant Habitats to Enhance Insect Biological Control	6841	Linker
Cover/Biofumigant Crops Influence Vegetables	6796	Sanders
Weed Management in Turf And Forage Crops and Plant Growth	6704	Yelverton

Regulator use in Turf		
Genetic and production environmental influences on processing and planting quality of nutritionally enhanced soybean seed	6632	Spears
Using Remote Sensing To Manage Nitrogen In Corn, Wheat And Soybean	6425	Heiniger
Development and refinement of strategies for peanut production in North Carolina	6466	Jordan
Development of Medicinal herbs, new crops organics, and sustainable e vegetable production systems	6832	Davis
Influence Of Orchard Management Systems On Tree Fruit Growth And Productivity	6196	Parker
Farming System Impacts on Strawberry and Tomato Diseases and Soil Microbial Ecology: Short and Long-Term Initiatives	6641	Louws
Management of Arthropod Pests of Turf and Peanut	6731	Brandenburg
Weed Management In Transgenic Cotton And Roadside Wildflowers	6835	York
Farm Level Decisions, Effectiveness Of Conservation Policies And Sustainable Land Use	6837	Wossink
Cultural Management of Strawberries and Grapes	6324	Poling
Small fruit production systems	6681	Fernandez
Integrated Peach Disease Management and Evolutionary Dynamics And Competitiveness Of Bacterial Plant Pathogens	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
Biology And Management OF Aquatic And Non_Cropland Weeds	6848	Orr
Contracting In Agriculture: Testing Theories About Incentives, Risk Aversion, And Asymmetric Information	6838	Vukina
Alternative Forages And Concentrates For Beef Cattle In The Southeastern US	6736	Poore
Developing Strategies for Improved Pasture Fly Management	6803	Watson
Nutritional Strategies to Improve the Growth, Productivity, and Profitability of Dairy Cattle	6605	Hopkins
Improving Reproduction and Management of Conventional and Pasture-Based Dairy Production Systems	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
Functional Fish Food Ingredients Produced By Solubilization/ Reprecipitation	6616	Green
Strategies To Enhance Meat Goat Production In North Carolina	6701	Luginbuhl
Integrating Crops And Livestock Systems In North Carolina	6602	Mueller
Economic Evaluation of Technical Change	5735	Brown
Mountain aquaculture research	6153	Hinshaw
Economic Of The Soybean Complex And The Impact Of Changes In Technology, Processing, Policy , and Trade	6781	Piggott
Economics of adoption of agricultural technologies	6610	Marra

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

This program is evaluating new apple cultivars with respect to their suitability for the southeast region. Larger field plantings have been made of six promising new cultivars to emerge from the NE 183 Regional Apple Cultivar Program in order to develop best management practice recommendations for producers. On-farm studies were 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. New technology for reduced drift from pesticide application in orchards is being evaluated that compares pesticide drift and biological efficacy with currently available methods. 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. Presentations were made to apple producers at the State and County level to educate growers on current developments in orchard management practices. An Integrated Orchard Management Guide for Commercial Apples in the Southeast was developed, updated and disseminated to all commercial apple growers in the Southeast.

Small fruit diseases and their control (Cline)
Project 6747

Since the early 1940s, USDA 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. This effort continues today. Disease investigations, control practices and recommendations tailored for our extended growing season have been under continuous development.

Disease Management of Ornamentals in Greenhouses and Nursery Crop Production
Project 6683 (Warfield)

There is a zero threshold level of tolerance for foliar nematodes in potted plants because of the ability of the nematodes to time due to their high reproductive capacity and short generation time. Traditional

nematode extraction techniques often fail to detect low nematode populations or the dormant stage of the nematode. As a result, foliar nematode infested material is often misdiagnosed and unknowingly propagated or shipped to other locations. Our diagnostic assay will provide a more accurate, high throughput method for screening vegetatively propagated materials helping to eliminate foliar nematode infestations at the source. Early detection of this pest, through screening of incoming or onsite plant materials will help growers maintain nematode-free facilities.destroy the aesthetic value of the plant in a relatively short amount of

Production strategies for improved vegetable production and alternative crops for diversification (J. Schultheis)
Project 6596
Covington sweet potato seems to be more responsive to N rate than Beauregard. The bottom line is that Covington root yields can be increased, and root sizing can be quicker in response to N. At least 60 pounds per acre N should be used as a standard N rate for many of North Carolina's sweet potato producing soils. For soils that are very sandy, 90 to 120 pounds per acre can improve sweet potato yields. A split application can also be advantageous when producing Covington in terms of yields and root enlargement compared with a single application. Nitrogen application with Covington sweet potato can be managed to improved earliness and overall yields.

Weed management for small fruits and vegetables (Monks)
Project 6735
Clary sage growers in North Carolina have no method for controlling broadleaf weeds in this crop. Research trials were conducted to identify an herbicide that would control weeds without crop injury. Gramoxone (paraquat) was found to give effective weed control and was safe to clary sage. A collaborative effort among North Carolina State University, the national IR-4 program, growers and Syngenta Crop Protection led to an EPA registration for Gramoxone herbicide in this crop. According to the contractor of this product, approximately $1 million per year will be saved by growers through the registration and use of this herbicide.

Evaluation of Managed And Unmanaged Plant Habitats To Enhance Insect Biological Control
Project 6841 (Linker)
Comparisons of insect populations and damage were made between organic and conventional cropping systems. Evaluations of beneficial insect habitat use on organic farms have been made. Evaluations of beneficial organism releases on organic farms were conducted. Increasing plant biodiversity on US farms has the potential to increase biological control of insect pest species. Managed buffers with a specific set of plants can provide improved water quality by slowing soil erosion, chemical movement and improve agroecosystem resources for pollinators and natural enemies of pest insects. Improvement in pollination and cost savings in controlling insect pests are expected. Workshops and training on these subjects was provided to audiences across the state, and was very well received by members of the organic and sustainable agriculture community.

Cover/Biofumigant Crops Influence Vegetables
Project 6796 (Sanders)
Controlled micro biotic compost improved crop growth and yield. Our study of compost was 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 and turf grass and forages and plant growth regulators for use in turf (Yelverton)
Project 6704
Progress continues to be made in developing cost-effective weed management programs for turfgrass and forage crop producers. For effective turf weed management, the turf must have acceptable tolerance. Tolerance trials were conducted on the various warm and cool-season grasses commonly grown in North Carolina utilizing experimental chemistries such as mesotrione and also newly-registered chemistries. Annual bluegrass control programs continue to be fine-tuned in overseeded and nonoverseeded bermudagrass turf. Sulfonylurea (SU) herbicides were tested at various October application dates for annual bluegrass efficacy and also perennial ryegrass tolerance when overseeded one week after application. Fall, winter and spring SU herbicide applications were investigated in nonoverseeded bermuda to determine if there is an optimum timing for postemergence annual bluegrass control. Biological herbicides were tested on catsear dandelion. Research was conducted on perennial weeds such as wild garlic, purple nutsedge, path rush, dallisgrass and Virginia buttonweed. Mesotrione was evaluated for postemergence smooth crabgrass, white clover and common dandelion control when applied to wet vs dry turf. Pre crabgrass control trials were designed to compare standard herbicides against generics that are being produced and promoted by smaller companies. Fluroxypyr-containing herbicides were tested against older chemistries on cool season weeds such as henbit, common chickweed, Carolina geranium and common dandelion, as well as warm season weeds such as common lespedeza and Virginia buttonweed. Newly registered Dismiss herbicide was tested on henbit, hop clover, purple nutsedge and goosegrass postemergence, as well as smooth crabgrass preemergence. Experimental granules containing mesotrione, trifloxysulfuron and other chemistries were evaluated on wet vs dry smooth crabgrass, catsear dandelion, white clover and buckhorn plantain. Turf trials were also designed to investigate the efficacy of removing bentgrass from tall fescue and tifway bermuda from el toro zoysia. Pasture weed trials targeted horsenettle control with newly registered aminopyralid vs industry standards. Herbicide programs for pre and post grass and broadleaf weed control were developed for switchgrass production before and after establishment.

Genetic and production environmental influences on processing and planting quality of nutritionally enhanced soybean seed (Spears)
Project 6632
Preliminary projects suggest the high oleic trait in peanuts and soybeans can reduce seed germination and vigor. Cooperative work with Dr. John Wilcut and his graduate students will help extension professionals formulate management practices based on germination parameters of different weed populations.

Precision agriculture for agronomic crops and nitrogen management for corn in Eastern North Carolina (Heiniger)
Project 6425
Research has identified the key components of a corn cropping system based on plant populations over 30,000 plants per acre, banded starter fertilizer and careful seed placement to achieve uniform plant spacing. This research indicates corn growers could increase yield by 22 to 27 bushels per acre using this system compared to previous corn management practices. The goal of this work is to identify high-yield corn management systems that allow growers to grow corn profitably.

Development and refinement of strategies for peanut production in North Carolina (Jordan)
Project 6466
Studies were conducted to define agrichemical interactions and to continue developing IPM approaches that potentially may lead to more efficient use of crop protection chemicals. Research has also been conducted to compare subsurface drip and overhead sprinkler irrigation and to determine if pesticide

inputs can be reduced in these systems. Cropping system experiments are in place at five locations in the state and some of these experiments have included various rotations since 1997. Results from applied research have demonstrated risks associated with adopting reduced tillage systems for peanut. Preliminary research has helped determine the possibility of using hyper-spectral and multi-spectral imagery to improve disease management and to assist in maturity determination. Performance of runner and Spanish market types has been compared in some experiments.

Developing new crops and sustainable production systems for vegetables and medicinal herbs
Project 6832 (Davis)

By the summer of 2006, 40 growers, many of them present or former tobacco growers, were involved in a project to determine the feasibility of growing medicinal herbs. Eleven medicinal herb buyers from four states cooperated on the project. They advised on the herbs they would like to buy, how to handle and test the herbs, and quality issues. We facilitated the buying and selling of the herbs between the cooperating growers and buyers and offered technical assistance to the producers. Farmers grew one or more of 17 kinds of herbs, including California poppy, valerian, Echinacea, dandelion, German chamomile, and skullcap. In addition to assistance in growing and marketing their crops, educational opportunities were presented in the form of workshops, field days, conference calls, newsletters and websites. County extension agents were trained so they could continue to assist farmers after the grant project was completed. Information on this project, including the step-by-step "How to Grow Medicinal Herbs in North Carolina" program, can be found at: *http://ncspecialtycrops.org/medherbs.*

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

We are evaluating preplant soil treatment strategies and new rootstocks to increase tree growth, survival and productivity. This is also being done in association with newer North Carolina developed peach cultivars (Intrepid, Challenger, Contender and China Pearl) that are cold tolerant during spring frost/freeze events. Educational programs have been developed and presented to growers and potential growers to provide the latest production information available such as preplant considerations, rootstock selection and cultural management.

Farming system impacts on strawberry and tomato diseases and soil microbial ecology: short and long-term (Louws)
Project 6641

Interdisciplinary, multi-state, and (stakeholder) participatory research, extension and educational programs were implemented to evaluate, adopt and develop alternatives to methyl bromide in strawberry and vegetable production systems. From 2000-2006, 47 Phase I trials (research conducted on research stations to evaluate new products or farming practices) and 28 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. Over 49 research and extension articles or abstracts were published. Results were translated to key stakeholders through 16 field and agent training programs and over 35 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 (R. Brandenburg)
Project 6731

A major research and extension effort focused on developing and implementing several management strategies to reduce the incidence of tomato spotted wilt virus. Research has proven the value of specific decisions on planting date, insecticide use, cultivar selection, tillage, seeding rate and row spacing.

Documentation of the tomato spotted wilt virus advisory has been placed on the North Carolina State University Web site, and this advisory has been widely adopted by growers. Host plant resistance studies have shown that thrips resistance is not the mechanism to select for virus resistance. The southern corn rootworm advisory has also been made available on line, and this continues to guide farmers in maximizing benefits from rootworm insecticide treatments. This research and extension effort has produced a rootworm advisory that provides sound decision-making principles for southern corn rootworm insecticide use and reduced unnecessary insecticide use by 49 percent. The tomato spotted wilt virus risk index has been validated and initially presented to growers, and the incidence of tomato spotted wilt virus has been 50 percent lower since this introduction.

Ecology and management of European corn borer (Van Duyn)
Project 0205

A study of brown stink bug in grain crops began in 2004. Field surveys were conducted for three seasons. Brown stink bug was monitored by sampling the crops, and pheromone traps were also used to trap bugs as the moved about in the environment. Within a seasonal cycle, brown stink bugs emerged from over-wintering in litter and other vegetation and moved to wheat fields and wild vegetation in early spring. While in wheat, the bugs reproduced, and immatures successfully developed into new adults. The increase in population in wheat fields was significant. As wheat matured and was no longer an attractive host, the bugs moved to near-by corn and cotton fields and fed upon the developing plants. In this situation the corn and cotton had not begun to fruit, and the bugs fed for a short period and left. In corn this resulted in damage only if the pre-flowering ears were immature; if the ears were near flowering they were not damaged. In cotton, some flower-bud damage occurred but this did not damage the crop. The bugs left these crops, but when fruit began developing on these crops, the brown stink bugs returned, fed upon and reproduced in the corn and cotton. In soybean, the bugs were not attracted to fields until pods (fruit) were available. Bugs could seriously damage small immature fruit, but as the beans became more mature bug damage decreased. Bugs moved among differing fields as early fruiting varieties became mature and late fruiting varieties began to develop pods. These findings allowed growers to understand when it is important to examine wheat, corn and soybeans for brown stink bug and thereby appropriately manage this pest.

Weed management and growth regulators for agronomic crops (York)
Project 6417

Glyphosate-resistant Palmer amaranth was found in North Carolina in 2005. Research in 2006 focused on screening 300 fields for resistance. Resistance was found over a wide area in Eastern North Carolina. Field research was initiated to develop management systems. In glyphosate-resistant cotton, best control was obtained with a program consisting of pendimethalin plus fomesafen PRE, glyphosate plus pyrithiobac or s-metolachlor POST, and diuron plus MSMA POST-directed.

Economic decision support for sustainable ag products (Wossink)
Project 6528

A two-year study is comparing zero-discharge production of hybrid striped bass with the current practice of annual draining and restocking of Phase II fish for final growout. Six ponds will be used during the normal two-year production cycle for hybrid striped bass. Three of the ponds will be managed under current practices of annual draining and restocking of Phase II fish for final growout (control). Three other ponds will be managed under a zero-discharge practice that eliminates annual draining between harvests and restocking (zero-discharge). Next, the economic data on hybrid striped bass production from CHF and the estimated changes in production levels caused by the different water management practices will be used in an environmental-economic trade-off analysis model. This model balances the cost of achieving water quality goals with the benefits and is used to compare the alternative BMPs. The

information generated from this work will be the first commercial-scale analysis of water conservation practices for hybrid striped bass.

Cultural management of strawberries and grapes (Poling)
Project 6324
The North Carolina Winegrape Grower's Guide was produced. The new publication is a revision of the Mid-Atlantic Winegrape Production Guide, which was produced in 1995. The new publication represents the work of nine faculty members and is designed to serve North Carolina emerging winegrape industry.

Small fruit production systems (Fernandez)
Project 6681
In response to anticipated growth in the commercial blackberry industry in North Carolina, a budget was developed for the costs associated with growing, harvesting and marketing 10 acres of blackberries. Costs to establish blackberries (field preparation and establishment) were $8,810/acre or $88,100 for 10 acres. In addition, a new grower could spend an average of $12,768/acre ($127,680 for 10 acres) for additional equipment, machinery and cooling facilities required for the production and proper post-harvest handling of the berries. This analysis showed that if growers received a wholesale price of $14.00/flat they would receive a return to land and management of $9,085/acre for the third through 10th years with a marketable yield of 9,000 lb/acre. The annual net cash flow is positive after the planting is established and enough revenues are projected to be generated to cover start-up expenses in the fourth year. The budget includes costs often ignored by growers such as overhead costs, fixed labor costs, and the costs of owning equipment and machinery (excluding depreciation). Despite these additional costs, blackberry production in North Carolina can be a profitable venture if grower use the recommended practices, secure a viable market and meet the post-harvest handling requirements.

Integrated Peach Disease Management (Ritchie)
Project 6160
Fungal and bacterial diseases of horticultural crops such as peaches and peppers can cause significant economic losses. Compounding this situation is the lack of adequate controls for bacterial diseases particularly once the epidemic has started. Successful management of bacterial diseases depends greatly upon prevention, with a heavy dependence on host resistance if available and preventative sprays using a very limited number of chemicals. For bacterial spot of stone fruits, it is important that spray applications be properly timed, taking into consideration that fruit are most susceptible immediately following bloom. Infection of fruit also is closely related to specific periods of moisture. A model is being developed with the objective of timing spray applications better and understanding of the disease epidemiology.

Management of arthropods on fruits and vegetables and Western North Carolina (Walgenbach)
Project 6402
Research is focusing on the population dynamics of spider mites to develop a model that can predict when fields become infested and the mite density-yield reduction relationship to determine when chemical control of mites is justified. Understanding the factors that lead to high mite densities in tomato fields will help researchers devise non-chemical management strategies that can be used by growers to delay or prevent mite populations from increasing to damaging levels. It is expected that chemical use on tomatoes will decline, which will decrease production costs for growers and reduce pesticide inputs and potential negative environmental impacts.

Best Management Practices for Anti Gibberellins in Floriculture Production (Whipker)
Project 6718
Optimal recommended rates for plant growth regulators vary by crop type. Working with GrowerTalks magazine, researchers developed a PGR Production Guide. The guide provides the latest information on optimal rates for PGR application. Greenhouse growers are using this guide to control excessive crop growth more effectively and efficiently.

Biological control of arthropod pests in weeds (Orr)
Project 6223
Studies of commercially available beneficial insect habitat seed mixes have provided growers with much needed guidance on whether to use these products, and if they choose to, how best to plant them. A simple, easy-to-use method was implemented to dramatically increase the lifespan of parasitic insects released for insect pest management. 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 select habitat plants to improve their insect management systems. Extension and outreach programs and materials in biological control have been delivered to a large number of individuals in a variety of client groups.

Risk aversion, risk shifting and alternative payment mechanisms in settlement of broiler contracts
Project 6527 (Vukina)
The objective of this research program is to study the contract design problem as it appears in agriculture and food sectors, to develop methods that would allow the identification and estimation of the structural models, and to test predictions aimed at assessing the empirical reliability of these models. The central orientation is on agricultural contracts frequently observed in North Carolina such as poultry and swine industries production contracts. In this segment of the project, we analyzed the transfer of risk from risk-averse farmers to risk-neutral (or less risk-averse) firms (integrators and packers), and the importance of producers' risk-aversion for the choice of alternative marketing arrangements (AMA) in the hog industry. We were able to show that: (a) Different types of AMAs exhibit different price volatilities as measured by the variance of price, and as such they may subject the producers selling their hogs through these channels to different levels of risk. (b) When it comes to risk shifting associated with the production contracts we were able to document that in a typical contract settlement formula, production contracts eliminate about 94 percent of the total income variability if one uses the income volatility of an independent market hog producer as the benchmark. (c) Finally, we showed that farmers who use production contracts are more risk averse than farmers who use the cash/marketing arrangements. The obtained results are consistent with the economic intuition that those farmers who are more risk averse self select themselves into less risky projects. The difference in risk exposure between the contract producers and independent farmers is huge as production contracts eliminate all but 6 percent of the total income volatility. Therefore the welfare losses associated with forcing producers to market their hogs through channels different from their risk-aversion-preferred marketing arrangement choice are substantial.

Use of alternative supplements in grazed, hayed and ensiled forage systems for beef cattle (M. Poore)
Project 6736
Applied research showed that both dry and wet corn gluten feed are economically viable feed ingredients for use in beef finishing diets. This information led to increased adoption of those ingredients in cattle diets. Other research exploring feeding frequency and feed sources has also impacted the profitability of byproduct utilization in the state. The 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 2006, over 1,000 tons of recycled poultry bedding, 10,000 tons of soybean hulls, 6,000 tons of dry corn gluten feed and 8,000 tons of wet corn gluten feed and 5,000 tons of other miscellaneous byproducts were utilized by clients for a realized savings of over $1 million.

Developing Strategies for Improved Pasture Fly Management (Watson)
Project 6803

Working with scientists at Cornell University, the University of Arkansas and the Center for Environmental Farming Systems (CEFS), we are exploring farming systems that are environmentally, economically and socially sustainable, including alternative fly management programs for dairy and beef cattle. We have evaluated an experimental electric walk-through flytrap that reduced horn fly populations on cattle and submitted a disclosure statement to the Office of Technology Transfer. A patent was submitted on the use of push-pull strategies for the management of pasture flies. The modified NZI biting fly trap was tested to aid in the management of stable flies on pastures. We have 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, increase soil percolation and nutrient cycling. Additional studies are focused on the enhancement of native biological control agents through augmentative release of parasitoids to control flies on dairies.

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

A study investigated the impact of supplementing rumen-protected forms of betaine, choline and methionine to diets with limited methionine content on performance and metabolism of early lactation Holstein cows. Supplementing rumen-protected choline significantly increased milk yield in multiparous early lactation Holstein cows fed methionine-limited diets. Information gained from this study will be used to develop feeding recommendations to improve growth and health in dairy calves and increase milk yield in cows.

Improving reproduction and management of dairy cattle (Washburn)
Project 6600

Data from a study that began in 1997 involving crossbreeding Holstein and Jersey cows along with data from other crossbreeding studies are providing evidence that crossbreeding of dairy cattle may have positive effects on traits of economic importance to dairy producers. If crossbred cows increase calf survival, reach puberty earlier and have improved reproductive success compared to Holsteins, then there should be potential economic advantages for use of a planned crossbreeding program in commercial dairy herds.

Use of feed additives to reduce aflatoxin transfer to milk (L. Whitlow)
Project 6778

North Carolina Cooperative Extension provides a dairy cattle nutrition educational program to dairy farmers and the dairy industry. Information includes the selection and use of feeds, feeding strategies, diet formulation programs, and the effect, prevention and treatment of mycotoxins. The State of North Carolina operates a feed analysis program for farmers to determine nutritional value and contamination with mycotoxins. Computer feed formulation programs are provided to the industry. Nutrition and feeding recommendations are supported by research at North Carolina State University. Cooperative Extension specialists and agents provide the latest information to dairy producers and the feed industry.

Genetic approaches to enhance efficiency and profitability of pork production (See)
Project 6496

The Pork Information Gateway (PIG) was launched at the 2006 World Pork Expo. This is a web portal of research-based and unbiased information and educational tools for the pork industry. Editors organize content in a manner that meets the needs of all potential users and never requires readers to conform to an interface that places unnecessary obstacles in their paths. The PIG consists of electronic publications organized as peer reviewed factsheets, Frequently asked questions (FAQ), references including books, conference proceedings and software, an image library, industry calendar of events, and a glossary.
An important aspect of PIG is that each of its centers interrelates. The Resource Center is the basis of the material used to develop FAQ for the answer center, and each FAQ is linked to its resource for further information. In addition, the materials in the Resource Center are the major references used in development of courses for the Learning Center to be added in 2007.

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

We are currently evaluating effects of fiber type and level on ammonia and odor. Addition of non-starch polysaccharides increased the concentrations of VFA in feces, but decreased concentrations of ammonia, indole and skatole. We have completed panel analysis of odor intensity of fecal samples from pigs fed different levels of fiber, and air samples collected from odor chambers that housed pigs fed different levels of dietary fiber. We are in the process of statistical analysis of the results.

Maximization of laying hen performance, economic return and egg quality (K. Anderson)
Project 6184

This program deals with egg production type chickens in the production environments and is designed to provide insight as to the well-being of laying hens under different cage densities and husbandry practices (molting). Non-Anorexic Molting programs are now the industry standard, but refinements to these alternative molting programs are needed to enhance their effectiveness as related to the previous industry standard program of fasting. These experiments have included a survey of the microbial shedding and egg quality from laying hens subjected to alternative molting programs. In addition, the integration of an egg solids study, for the breaking industry, along with functionality and egg safety studies were recently completed.

Fish food ingredients produced by solubilization/reprecipitation (Green)
Project 6616

Research has shown that rapid cooling of 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 research studies into other intervention strategies.

Strategies to increase meat goat production (Luginbuhl)
Project 6701

We are evaluating forages for year-round grazing and to control gastrointestinal parasites. We are evaluating three varieties of fescue with lactating does and their kids in spring and with growing replacements in fall, grazing the same fescue varieties stockpiled for fall/winter. An additional field was planted with MaxQ fescue, orchardgrass and chicory, a forage having potential to control gastrointestinal parasites. Another field will be planted with pearlmillet, Sericea lespedeza (a forage known to contain tannins that affect gastrointestinal parasite fecundity) and a combination of both to examine performance of growing goats during summer and control of gastrointestinal parasites.

Integrating crops and livestock systems (Mueller)
Project 6602
Silvo-pastoral studies with meat goats are focusing on defining the utility of Black Locust as a browse species for goats. Additionally, a 3-year grazing study is looking at meat goat performance and preference for tall fescue cultivars.

Economic evaluation of technical change
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. Information provided to farmers helped them decide whether to retire, take off-farm employment, switch to other farm enterprises, or expand their production. Information provided to financial providers, attorneys, tax preparers, farmers and quota owners helped them with decisions regarding tax treatment of buyout payments, investment of buyout payments, whether or not to take a lump sum from a financial institutions, and estate questions.

Mountain aquaculture research (J. Hinshaw)
Project 6153
Researchers began the first comprehensive yield verification study of trout farming in the U.S. Yield verification trials are designed as a means of achieving implementation and evaluation of Extension's research-based recommendations. Joint research and extension trials are designed to implement, demonstrate and test such recommendations against yields obtained through existing practices used in commercial production settings. Yield verification trials are widely credited with increasing state yield averages for several major commodities, including other aquaculture products. Predicted values for growth, size uniformity, feed conversion, survival and farm yield from research facilities may or may not reflect observed values in commercial settings. In particular, recommended practices for trout production were generally developed in research or public hatchery settings over 20 years ago, prior to adoption of high-energy extruded diets, oxygenation techniques and modern vaccination methods.

Economics of the Soybean Complex and the Impact of Changes in Technology, Processing, Policy, and Trade (Piggott)
Project 6781
Some of the economics of bio-energy (ethanol and biodiesel) have been studied and penciled out. Also, the benefit of blending of petroleum-based fuels with bio-based fuels has been analyzed and has been shown to have a stabilizing impact on price volatility. The results of these analysis remains the topic of further current work but has been presented at national conference held by Risk Management Agency in Kansas City in summer 2006. It has also has been presented in North Carolina in county meetings involving grain growing regions of Chowan, Bertie, Perquimans and Gates counties. This work has served to inform interested parties of the economics of bioenergy, as well as the catalyst for the current run up in grain prices, and where a new equilibrium might be achieved.

Economics of adoption of agricultural technologies (Marra)
Project 6610
Data were obtained for a study of the effects of a natural refuge for Bollgard II cotton. This resulted in the following publication: Piggott, N.E. and M.C. Marra. 2006. "The Net Gain to Cotton Farmers of a Natural Refuge Plan for Bollgard II® Cotton". AgBioforum, in review. In addition, other publications were produced, including Vukina, T., A. Levy, M.C. Marra and B. Ziang. 2006. "Do farmers value the

environment? Evidence from the Conservation Reserve Program Auctions." *American Journal of Agricultural Economics,* in review (second round); Sydorovych, O. and M.C. Marra. 2006. "A New Risk Index for Measuring Pesticide Use." Submitted to the *Journal of Agricultural and Resource Economics,* in review; Dan Phaneuf, M.C. Marra, and J. M. Alston. 2006. "The role of public goods characteristics in the adoption of a new biotechnology: The case of corn rootworm-resistant corn." *American Journal of Agricultural Economics,* in revision to resubmit; N.E. Piggott and M.C. Marra. 2006. "Modern Determination of Soybean Acreage: The Effects of Biotechnology and Recent Farm Policy", in preparation for submission to the *American Journal of Agricultural Economics;* Marra, M.C. and N.E. Piggott. 2006. "Measuring and Correcting for Part-Whole Bias in Non-pecuniary Values in Crop Biotechnology", in preparation for submission to the *American Journal of Agricultural Economics.*

GOAL 2
A SAFE AND SECURE FOOD AND FIBER SYSTEM

Integrated Project	Project #	Name
Evaluation of pre and post –production- strategies for inhibiting food borne bacterial pathogens associated with poultry	6774	Sheldon

The poultry food system: A farm-to-table model (Sheldon)
Project 0292 &6774

Broilers raised either on litter floor or in cage batteries were fed either a finely ground corn- (control), a finely ground triticale or a whole triticale-based diet from 0-42 days. Microbial DNA was extracted from the ileum content of 42-day broilers and the 16S rDNA gene was amplified by PCR and the amplicons separated by DGGE. Diversity indexes including richness, evenness, diversity and pairwise similarities coefficient were calculated. Diversity indexes were related to the dietary treatments, housing designs and with changes in *Salmonella* colonization of broiler ceca as characterized by the most probable number method (MPN). Higher microbial diversity indexes were observed among birds fed whole triticale-based diets and reared on litter floor. In contrast, finely ground grain treatments had lower diversity and higher *Salmonella* prevalence than the whole triticale treatment. The combination of high dietary fiber content and increased coarseness of the diet by feeding whole triticale presumably stimulated microbial community diversity and discouraged *Salmonella* colonization through a competitive exclusion type mechanism.

GOAL 3
A HEALTHY, WELL-NOURISHED POPULATION

Integrated Project	Project #	Name
Biology and control of Nuisance Vector Arthropods in NC	6752	Apperson

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

Stormwater retention facilities were sampled to characterize the seasonal occurrence and relative abundance of mosquito species in relation to the structural complexity and biological diversity of the

facilities. The three different types of facilities included standard wetponds, innovative ponds and wetland ponds. All retention structures were sampled at the beginning, middle and end of the mosquito season so that seasonal changes in mosquito production could be characterized. Mosquitoes were collected from 34 percent of the retention structures. Fourteen species representing seven genera were collected, but only five species (Culex erraticus, Cx. territans, Anopheles quadrimaculatus, An. punctipennis and Uranotaenia sapphirina) were commonly collected in all three types of stormwater management facilities. In general, the seasonal prevalence and relative abundance of mosquito species did not vary among three types of retention structures. A significant association (P,0.01) between the presence of mosquito larvae or pupae and the absence of mosquitofish was found for innovative and wetland stormwater retention facilities but not for standard retention facilities (P.0.05).

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

Integrated Project	Project #	Name
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 through advancements in treatment technologies	3975	Losordo
Ecotoxicological Effect Of Contaminants In Aquatic Ecosystems	6509	Cope
Evaluation of soil and site criteria for onsite wastewater and land use decision	6647	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 (Bilderback)
Project 6224

Incremental amounts of cotton stalk and swine waste compost-amended pine bark substrates were used in research study to grow an ornamental nursery crop. Laboratory physical and chemical analyses were also conducted. Plant growth results showed top dry weight of cotoneaster increased linearly with increasing rate of the compost. In addition, top dry weight of cotoneaster grown in 15 percent, 30 percent and 45 percent compost was significantly greater than cotoneaster grown in a pine bark:sand control substrate.

Home grown back yard alternatives are seldom available resources of value. In this case cotton stalk swine waste compost additions fit well with nursery production practices. The composts provided excellent growth, had appropriate physical properties and provided sufficient micro nutrients, calcium, magnesium and contributed to the NPK requirements to grow nursery crops in containers.

Evaluation and modeling of riparian buffer performance in the Neuse River Basin (Evans)
Project 6609

Pilot studies were implemented to demonstrate and evaluate alternative channel management strategies and design geometries to identify alternatives that would enhance water quality functions while maintaining the necessary drainage function. Channel alternatives included: establishment of in stream and riparian wetlands, lowering of the floodplain to reconnect the channel with the floodplain, redesign of channels using natural channel design principles, and establishment of conservation easements to encourage establishment of perennial riparian buffer vegetation. Hydrology and water quality were monitored from one to three years at each site. In addition, plant communities and macro-invertebrates were monitored at three sites. Nitrogen transport was reduced by 20-40 percent with in-stream wetlands. Reconnecting the channel with the floodplain dampened the hydrograph peak and reduced the "out-of-floodplain" risks outside the project area. These projects accomplish the first step in the evaluation process which is to demonstrate technical feasibility. The alternative practices were more expensive and resulted in two to three times more land area being taken out of production compared to conventional drainage practices. The project costs in these studies ranged from a low of about $40/linear foot of channel to $140/linear foot of channel. However, the benefits were improved water quality, lower peak outflow rates and enhanced habitat for wildlife. It is concluded that there are environmentally friendly alternatives to traditional practices of frequently cleaning and mowing trapezoidal ditch channels to achieve drainage requirements. However, in most cases, the added costs may not be justified by increased drainage benefits to the landowner. Therefore, it becomes incumbent on society to put a value on the water quality and ecological functions achieved to determine if public funds should be used to help landowners offset the costs of achieving the additional water quality and ecological functional benefits.

Precision agriculture for agronomic crops and nitrogen management for corn in Eastern North Carolina (Crozier)
Project 6652

Researchers collaborated with producers to develop fertilizer rate and timing recommendations for conventionally produced agronomic crops as well as certified organic production systems. The ongoing education of farmers, county agents, regional agronomists, agricultural consultants and certified crop advisors enhances voluntary adoption of best management practices. Acceptance of certain practices is mandatory, and needed to achieve nutrient reduction goals for runoff into rivers. Field tours serve to generate producer interest in these activities, with meetings scheduled to disseminate more specific results. Four research publications describe recent grain crop nitrogen management issues. A coordinated effort was developed to successfully deliver nutrient management education to Tar-Pamlico River basin farmers. Planned field experiments and field day demonstrations will further educate farmers in this area about optimal utilization of this new resource. Collaboration is ongoing with the North Carolina Department of Agriculture and Consumer Services to re-evaluate and update critical sulfur level guidelines for grain crops. This collaboration, as well as efforts to improve nutrient deficiency problem diagnosis in general, led to the development of a Soil Fertility field training event in July 2006 for 33 agronomic professionals, with plans to develop a website containing photographic images and relevant laboratory data.

Evaluation of tillage practices, organic production, and trickle fertigation for nutrient management (Hoyt)
Project 6648
Researchers developed between-row mulching for Christmas trees by using live white clover plantings to stabilize sloped land and recycle plant nutrients. Biological nitrogen fixation in the white clover also increase soil nitrogen to reduce grower inputs of nitrogen. A majority of farmers across Western NC are adopting these cover cropping practices for Christmas tree production. Farmers using this conservation practice will improve soil organic matter and nutrients available to Christmas trees, along with reducing water and sediment runoff to streams and improving water infiltration into the soil.

Nutrient and by-product utilization and health of turkeys and broilers (Ferket)
Project 6343
A new technology called in ovo feeding (administration of nutrients into the amnion of embryos) was developed to improve enteric development of young poultry and improve resistance to enteric disease. After surveying the changes in metabolism during late-term incubation in turkeys by gene array technology, in ovo feeding solution formulations were optimized. Automated delivery of in ovo feeding solutions achieved more than 90 percent amnion targeting, and advanced enteric development and digestive capacity by two days, resulting in better early growth performance and survival. Global patents have been awarded for this technology and a commercial company (Embrex, Inc.) will be field testing at commercial turkey and broiler companies in 2007. In ovo feeding has been demonstrated to improve hatchability and energy status of hatchlings, and increase appetite and early growth rate by 3 to 10 percent over controls. Breast muscle development of chicks and poults was also improved.

Effect of management on turkey production, turkey reproduction and turkey waste handling (Grimes)
Project 6390
An experiment was conducted using Large White turkeys to test the suitability of different cotton based materials for use as turkey bedding. Treatments consisted of the following: 1) pine shavings, 2) industry shavings (sawdust) 3) cotton gin trash (GT1), 4) cotton gin trash with extra burrs (GT2), 5) chopped cotton stalks, and 6) aGroChips (a processed and pelleted mixture of old news print, gypsum, and cotton fibers). Birds were observed for growth and performance. Litter cake material was removed at six and 20 weeks of age and at other times as needed. Litter cake removed from each pen was recorded by weight. Typical turkey diets were provided. There were no treatment effects on body weight of the turkeys at any time during the trial. Birds were slightly below the breeder's standard at six weeks and below standard at 12 and 20 weeks of age. This may have been due to the seasonably hot weather during June – September and lack of sufficient air movement in the turkey facility. Cumulative feed conversion was different by treatment only at 12 weeks. Birds reared on aGroChips had a higher (worse) feed conversion (2.08) compared to the birds on the other beddings (mean=2.01). However, by 20 weeks of age there were no differences due to bedding treatment, and the flock mean feed conversion (2.64) was similar to the breeder standard (2.58). Pen litter cake was different by treatment at both six and 20 weeks of age. Pens with industry shavings had consistently less cake at six (4.9 kg) and especially at 20 (116.5 kg) weeks of age. Even pens with pine shavings (196.5 kg) had more cake than pens with industry shavings at 20 weeks of age, which was unexpected. Some of the cotton derived beddings resulted in similar pen litter cake levels compared to pine shavings, but all resulted in higher pen litter cake levels compared to industry shavings. Pens with aGroChips (235.2 kg) bedding had the highest litter cake levels. The pens with gin trash 1 (184.4 kg), gin trash 2 (171.9 kg) and chopped cotton stalks (204.5) were intermediate in litter cake levels.

Improved efficiency of water reuse aquaculture systems (Losordo) (DeLong)
Project 3975
The Fish Barn program has focused on effluent management with an eye toward complete water reuse. In 2005 - 2006, the program took a commercially available technology called Geotube and used it in combination with other technologies to create a very affordable and efficient waste treatment system. The geotextile bag, when used with a potable water approved organic polymer, has achieved solids removal from the Fish Barn waste stream of up to 98 percent in a single pass.

Bioavailability, transport and fate of contaminants in aquatic ecosystems (Cope)
Project 6509
Research has been done to determine the effects of fluoxetine exposure on the endocrine and reproductive health of native freshwater mussels and to assess the proximity of effects to environmental concentrations. Our results have shown that concentrations of fluoxetine near to those measured in the environment will induce parturition (or spontaneous abortion) in gravid female mussels or spawning (release of gametes) in male and immature female mussels via serotonin-mediated pathways after a relatively short-term exposure.

Evaluation of soil and site Evaluation BPM's for On-site Wastewater Systems in Seasonally Saturated Soils. (Lindbo)
Project 6800
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 the overestimation of soil wetness depth results in systems being installed too deep in the soil and being subject to premature failure.

Performance of on-site wastewater system and other land-based technologies for Low Impact Development (LID) Hoover
Project 6793
North Carolina State University and North Carolina Cooperative Extension worked with the Wake County Department of Environmental Services to assist the County in a pilot study to determine how well septic systems are functioning. The study indicated that the vast majority of systems (90 percent) were operating fine, even in the worst-case scenario, that is, the springtime when system performance is usually most at risk. It was concluded that the County regulatory program was on track. However, the failure rate observed (about 8-10 percent) was agreed to be too high. The study identified specific O&M factors that have significant effects on system failure rates and also showed which factors don't influence failure rates. 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 significantly reduced failure rates and was one of the important factors that must be addressed in order to keep system failure rates low.

GOAL 5
ENHANCED ECONOMIC OPPORTUNITY AND QUALITY OF LIFE FOR AMERICANS

Integrated Project	Project #	Name
Economics of socially optimal pork production	6706	Zering

Economics of socially optimal pork production (Zering)
Project 6706
Reports were completed in 2006 on economic analysis of 11 alternative manure management systems evaluated through the North Carolina State University Animal and Poultry Waste Management Center and the North Carolina Attorney General's agreements with Smithfield Foods, Premium Standard Farms and Front Line Framers. Systematic evaluation of the expected costs and returns of two additional technologies was conducted in 2006. This information is viewed as being of critical importance in determining the direction of legislation, regulation and design of pig production systems in North Carolina.

Integrated Summary:

Integrated Extension-Research Projects using Smith-Lever funds reported: 52

Smith Lever B & C funding Planned: 14.2% ($1,484,205)

Total Smith Lever B & C funding allocated to the 52 projects for FY 2006: $2,284,426

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: 2006

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)				$10,452,147		$10,452,147	
This FY Target Amount				$195,455		$1,484,205	
Title of Planned Program Activity							
Goal 1	An Agricultural System That is Highly Competitive in the Global Economy			$268,032		$1,736,163	
Goal 2	A Safe and Secure Food and Fiber System			$52,410		$52,410	
Goal 3	A Healthy, Well-Nourished Population			$73,638		$49,971	
Goal 4	An Agricultural System That Protects Natural Resources and the Environment			$26,246		$419,012	
Goal 5	Enhanced Economic Opportunity and Quality of Life for Americans			$231,482		$26,870	
	Total			$651,808		$2,284,426	
	Total allocation			$10,452,147		$10,452,147	
	Carryover (2005)			$278,106		$759,746	
	Carryover (2006)			$456,353		$800,221	
	Net Carryover (2005 plus 2006)			$734,459		$1,559,967	

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.

3-20-07

Director **Date**