2012 North Carolina A&T State University and North Carolina State University Combined Research and Extension Plan of Work

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I. Plan Overview

1. Brief Summary about Plan Of Work

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This Plan of Work includes research and extension programs at North Carolina State University (NCSU) and North Carolina A&T State University (NCA&T). These programs and activities are designed to discover and develop new knowledge and technology that will allow North Carolinians to lead prosperous, healthy lives. This Plan represents the combined research and extension programs, which largely emanate from the College of Agriculture and Life Sciences (CALS) at NCSU and the School of Agriculture and Environmental Sciences (SAES) at NCA&T. North Carolina Agricultural Research Service is the research arm at NCSU, while research at NCA&T is conducted under the auspices of Agricultural Research Program (ARP) within SAES; together, they devote their resources to supporting the research operation represented in this POW. At both institutions, the research effort serves interests in agriculture, environmental, and biological or life sciences. In addition, the research program provides the scientific base for academic and extension programs delivered by the two colleges.

NCARS is the principal state agency for research in agriculture, life sciences, forestry, and family and consumer sciences. Research projects involve the NCSU Colleges of Agriculture and Life Sciences, Natural Resources, Physical and Mathematical Sciences, Design, Engineering, Veterinary Medicine and NC Sea Grant, as well as the School of Human Environmental Sciences at the University of North Carolina-Greensboro. NCARS supports research in 18 departments and works in partnership with the North Carolina Cooperative Extension Service and Academic Programs. The NCARS mission is to develop the knowledge and technology needed to:

- improve the productivity, profitability, and sustainability of industries in agriculture and life sciences;
- conserve and improve the state's natural resources and environment; and
- improve the health, well-being, and quality of life of all North Carolina citizens

The mission of ARP is to identify, seek solutions and have impact on current and emerging agricultural issues at the local, state, national and global levels, including the improvement of agricultural methods and products and the improvement of the lives and communities, especially of rural under-served and under-represented groups; provide experiential learning opportunities for graduate and undergraduate students in the food, agricultural and environmental sciences; and articulate the meaning of science and technology in agriculture.

NCARS conducts research at facilities on and off the N.C. State University campus. On-campus facilities include highly specialized laboratories (i.e., molecular imaging, soil analysis, and x-ray crystallography), greenhouses, the Phytotron controlled environment facility, the Biological Resources Center small animal facility, Pesticide Residue Laboratories, the Animal and Poultry Waste Management Center, Feed Mill, Structural Pest Training Center, Genomic Sciences Laboratory, Plant Transformation LaboratoryBioinformatics Research Center, Food Rheology Lab, Nuclear Magnetic Resonance Facility, Plant Disease and Insect Clinic and Food Processing Pilot Plants. Off-campus facilities include eight field

laboratories with extensive animal and crop research capability and facilities for agricultural and municipal waste management research; regional research and extension centers with resident research and extension faculty in both western and eastern North Carolina; and 18 agricultural research stations strategically located throughout the state, including the Center for Environmental Farming Systems, which specializes in sustainable agriculture research and extension.

Organized research at NC A&T State University is conducted in the ARP in the School of Agriculture and Environmental Sciences by research faculty. Much of the research activity is sponsored by the United States Department of Agriculture. It is conducted on the university farm, the Center for Environmental Farming Systems (CEFS) in Goldsboro, NC and on-campus laboratories where investigations include such disciplines as agricultural economics, animal science, plant science, landscape architecture and design, human nutrition, housing, food science, and animal health.

The knowledge and technology developed through research conducted in NCARS and ARP are made available to North Carolina citizens through North Carolina Cooperative Extension. Both the CALS and SAES work collaboratively to provide educational opportunities that are relevant and responsive to the needs of individuals, communities, counties, and the state. North Carolina Cooperative Extension is at the heart of this partnership and is the principal agency providing these educational opportunities.

Cooperative Extension's mission is to help people put research-based knowledge and technology to work to foster economic prosperity, environmental stewardship, and improve quality of life. To address ever-changing needs, Extension's statewide long-range plan changes as needs and circumstances dictate. The plan focuses on three priorities:

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

To achieve the plan's objectives, extension specialists and researchers at the two land-grant universities work hand-in-hand with field faculty stationed in all 100 North Carolina counties and on the Cherokee Reservation in the state. To achieve relevance and value in its programs Extension benefits from the input of a well-established statewide system of lay advisers, who represent the state's diverse population. Each county periodically conducts an environmental scan to determine emerging needs and appropriate educational responses. These scans give residents, advisers, commodity group representatives, volunteers, and other clients an opportunity to ensure that local programs meet local needs and priorities. Cooperative Extension also maintains a civil rights plan that includes computer monitoring of program participation by gender and race. This effort ensures that underserved and underrepresented audiences are among those included in program development and implementation. A permanent Diversity Task Force monitors programs, suggests policy, and develops and conducts training for the organization. Stakeholder input informs all Extension programs.

North Carolina's population grew significantly during the 1990s and early 2000s, due in part to a temperate climate, a favorable economic climate and abundant natural resources. While population growth has slowed since the middle of this decade, the state's population continues to expand. Much of this growth can be attributed to an expanding Hispanic population (the state's Hispanic population grew faster than that of any other state in the 1990s) and an influx of retirees. The state's urban areas have experienced more growth than rural areas; the most rural areas of the state experienced very little population since 2000. Despite the growth of the state's urban population, roughly half of all North Carolinians continue to live in rural areas.

The in-migration North Carolina has and is experiencing is expected to fuel economic growth in many service sectors, particularly for retirement age and Latino households. Community leaders expect to preserve the high quality of the local natural environment while also providing needed services. Rural

citizens will request advanced training on creating new business opportunities. Traditional clients will continue to request assistance in evaluation of more traditional agricultural and agribusiness technology. We anticipate an increase in the number and variety of larger businesses as well as an expansion in the number of home-based, smaller scale firms starting up in the state. Both segments seek to improve the financial position of their households by enhancing business and technical skills. As a result, many small and large businesses will request assistance in learning sound money management skills. This Plan of Work describes research and outreach efforts designed to assist North Carolinians in implementing programs that promote sustainable economic development and responsible management of financial assets. These programs will make families more secure financially. This Plan is designed to integrate economic and production decision making to ensure that limited resources are managed wisely and economic value is generated.

The Plan also describes efforts to aid North Carolina families and children and to help ensure the health of North Carolinians. The rapid societal changes we see in North Carolina can challenge and stress families. We will support families by providing them with the resources needed to deal with issues created by these challenges and stresses. Research and Extension programs will give parents positive parenting skills and reduce or eliminate instances of child abuse and neglect. Consumers and families will use research and Extension programs to make and use money management plans to conserve, extend and/or increase personal family income; develop skills to help maintain and/or increase the value of their homes; and learn to create healthy, safe homes.

Research and Extension efforts will support North Carolina's children through North Carolina Cooperative Extension and Extension's 4-H Youth Development Program. The 4-H Program designs, implements and evaluates programs targeting six Long Range Focus Areas: 1) Healthy Eating, Physical Activity and Chronic Disease Risk Reduction; 2) Preparing Youth for an Employable Future and Economic Success; 3) Building Community through Volunteerism; 4) Building Citizen Leaders, 5) Developing Life Skills and 6) K-12 Academic Achievement. Through these six areas, the 4-H Program will address issues such as obesity, persistently high rates of alcohol and other drug use, teenage pregnancy, violence, and poor academic performance. Through our 4-H Program, we hope to ensure that today's children will become adults who will comprise a competent work force and engaged citizenry.

Research and Extension programs in this Plan of Work also address the health of North Carolinians. Dietary factors are associated with five of the 10 leading causes of death in our state (and in the United States), including coronary heart disease, some types of cancer, stroke, non-insulin-dependent diabetes mellitus, and atherosclerosis. Overweight and obesity have reached epidemic proportions and have become one 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 U.S. are overweight or obese. There are almost twice as many overweight children and three times as many overweight 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. Efforts described in this Plan of Work are designed to help North Carolinians, including limited-resource individuals and families, improve their health and the quality of their lives by eating healthy diets, being active, managing resources for food security, and practicing health-promoting behaviors. In addition, research findings are expected to significantly impact the control and prevention of human diseases influenced by insects and other pests, as well improving health from the consumption of fresh fruits and vegetables, their nutritional components and functional foods.

Agriculture and agribusiness represent one of North Carolina's most vital economic engines. Indeed, the food, fiber and forestry industries account for roughly a fifth of our state's income and employment. Agriculture and agribusiness are vitally important to the economic well being of North Carolina. Our state's agriculture has become more diverse to meet the demands of a changing population and market opportunities. We produce more than 80 crops with an annual market value of $3.5 billion. Growers have diversified into many specialty crops, including medicinal herbs, specialty melons, heirloom fruits and vegetables, various crops for the state's growing Hispanic and Oriental populations, kenaf, sea oats, and wine grapes as well as organic production of various fruits and vegetables. Diversification has been driven in part by the decline of agricultural price supports and subsidies in North Carolina. Tobacco and peanuts

no longer receive federally guaranteed prices. This means that some traditional field crops and their production systems are yielding to new crops with different tillage, water management, and harvest needs in addition to different post-harvest storage and processing requirements. Diversification has placed demands on the NCARS and ARP to develop sustainable programs for producing, protecting, harvesting, storing, and marketing these commodities, as well as on Cooperative Extension to assure that appropriate audiences are adequately educated to use the latest developments.

Researchers at NC A&T are investigating post-harvest processing methods to reduce and/or remove harmful allergens in peanuts. Successful results to develop hypo-allergenic peanuts products will be a god-send for millions of peanut allergy sufferers and to the peanut industry.

The use of insecticides in fresh fruit and vegetable production continues to be widespread and has increased over the past several years driven by the demand for blemish-free produce. The vast majority of Americans still consumes conventionally-grown crops, and the small growers who account for a substantial amount of the vegetables that Americans consume must be given increased attention in order to make production of produce more sustainable and safe to growers, consumers and the environment. Thus, the use of agrochemicals in crop production is likely to continue for the foreseeable future. Pesticide contamination from both insecticides and herbicides can have very adverse effects on the environment and human health, especially for rural communities that depend on wells for their domestic and agricultural water supply.Researchers and extension educators at both NC A&T and NCSU will continue to promote integrated pest management practices to wise and safe use of pesticides when they are necessary.

The Plants for Human Health Institute at the North Carolina Research Campus was established during the past five years as a multi-institutional research and outreach effort to expand our knowledge and availability of fruits, vegetables and other plant derived compounds that have a variety of beneficial health attributes. NCSU and NCA&T as well as six other institutions and significant industry partners, including Dole Foods and Monsanto Company are involved in the program. This effort is complemented by numerous other programs at NCSU and NCA&T seeking to find new crops, new plant compounds and new plant material processing methods to deliver a variety of products that can impact health, energy and food supplies and help protect the environment (anti-oxidant producing plants; plant based fiber sources for energy conversion; specialty crops; industrial sweet potatoes for dye and energy production, e.g.). In addition, at NCA&T, scientists will explore methods for cost effective utilization of grape pomace to deliver health benefits of its bioactive compounds to consumers without generating new or additional health and environmental problems. Ground grape seed in food products such as bakery goods and meat products could be an economic way of utilizing health promoting components of grape pomace, and it may also provide consumers, particularly low income families in NC, with an easy and affordable way to access the bioactive health promoting polyphenols in grape seeds.

Tobacco once dominated North Carolina agriculture and is still an important part of the state's agricultural economy. However, animal agriculture now accounts for nearly 65 percent of our state's farm cash receipts and impacts particularly our rural areas economically and in other ways. Animal production research and extension efforts undergird our livestock and poultry industry which accounts for close to $6 billion farm gate value annually. Nutritionists seek efficient use of expensive feed inputs to optimize production and product quality. Breeding and reproduction scientists seek ways to management animal genetics and reproductive processes to gain a productive and efficiency advantage, and interactions with NCSU's College of Veterinary Medicine help provide medical solutions to efficient animal production systems. Food scientists constantly look for new value-added products and ways to keep animal products safe and nutritious. Manure and other waste management is a pressing issue for animal agriculture. Mandates from state government to reduce odor and eliminate the use of lagoon/sprayfield waste treatment systems in confined animal operations are influenced the direction and urgency of research and outreach efforts. These efforts are aimed at enhancing our understanding of the physical, biological, and

chemical processes and interactions influencing agricultural ecosystem impacts. Engineering solutions for animal waste management are an important part of this Plan, including advanced technologies to produce energy from animal manures, systems to separate solids from liquids to enhance treatment capabilities and produce useful soil-amending products.

We anticipate that engineering, specifically bioprocess engineering, will increasingly play an important role in supporting the emerging biotech and industry in our state and in the search for alternative fuels. At the same time, food safety and security concerns, as well as the search for new products, have increased, and engineering will play a role in addressing these concerns and opportunities as well. For example, microwave technologies have been deployed in food processing methods to produce aseptically packaged fruit and vegetable purees for food manufacturing, resulting in businesses that have been established around these processes. Bioengineering and bioprocessing will likely also play a role in application of technologies and biological processes discovered at NCSU and NCA&T that may impact production and delivery of specific nutritional or health enhancing compounds found in plants, or that enhance the delivery of vaccines or more effective antibiotics and probiotics to fight disease. And, advanced sensing systems coupled with bioinformatics will allow us to generate predictive models and solutions to a wide array of contemporary and complex problems that can impact food production, environmental quality and sustainability, good health and disease prevention or treatment. Engineering solutions will continue to aid in pollution prevention on a watershed scale, where there is an increasing demand for natural designs of best management practices rather than traditional designs that are more structural in nature. Similarly, engineering solutions will play prominently in developing systems to produce biofuels from a variety of raw materials, to reduce fuel consumption and improve energy efficiency in agricultural and food systems and in enhancing the efficiency of water use in a variety of agricultural and related functions.

Interdisciplinary research efforts at NCSU and NCA&T are a necessity if we are to advance our knowledge of natural processes to enable development of production management and environmental protection technologies and strategies that will increase productivity; improve input efficiency; conserve natural resources; and improve and protect environmental quality. Efforts described here will address increasing emphasis being placed on air quality improvement and management and energy use, particularly as it relates to animal production systems. Interdisplinary research and outreach approaches will also be the norm as our scientists address complex research problems that impact food and fiber production, protecting the environment, solutions to good health and disease prevention or treatment and other attempts to understand and commercialize new technologies to benefit society.

The research and Extension efforts described in this Plan are designed to support economic development by helping agricultural producers develop sustainable production systems for traditional as well as new agricultural enterprises. Sustainable production systems will ensure a healthy and viable agricultural economy while also protecting the environment. The efforts described here will also improve quality of life in North Carolina by helping to provide a nurturing environment for children and supporting our state's families and communities. This Plan describes work that will make life in North Carolina better and North Carolina a better place in which to live.

This Plan contains the five NIFA societal challenge areas(Global Food Security contains separate plant systems and animal systems programs), plus two additional programs that capture our broader activities in human and community development, Youth and Family programs and Human Health Nutrition and Well-being. Within these eight program areas are fifty-six Program Knowledge Areas that make up the Plan's specific components. The eight Planned Program Areas are as follows:

- Global Food Security - Plant Production Systems and Health
- Global Food Security - Animals and Their Systems, Production and Health
- Climate Change

- Sustainable Energy including Biotechnology
- Childhood Obesity
- Food Safety - Food Production Systems; Development, Processing and Quality
- Human and Community Development - Youth Development and Families
- Human Health, Nutrition and Well-being

II. Merit Review Process

1. The Merit Review Process that will be Employed during the 5-Year POW Cycle

- Internal University Panel
- External University Panel
- Combined External and Internal University Panel
- Combined External and Internal University External Non-University Panel
- Expert Peer Review

2. Brief Explanation

For NCARS, a thorough scientific and merit review of each proposed new or revised Hatch research project is made at the departmental level prior to submission to NCARS. This review consists of two parts: an informal review (PI's responsibility) and a formal review (Department Head's responsibility). Cooperative Extension's work is closely coordinated with the efforts of NCARS. In fact, about 100 of the 300 Extension faculty within CALS have joint appointments with NCARS, collaborating with nearly 350 Extension agents who plan and deliver educational programs across the State. This effort is further strengthened by the Extension programmatic efforts of NCA&T agents and faculty who collaborate with researchers at NCA&T. In addition to this alliance with research faculty at both institutions, NC Cooperative 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.

The research director in SAES determines the need, priority, and scientific feasibility of proposed Evans-Allen projects and the development and implementation procedure for project documentation, merit review, and selection. Theprocedure assures that the research proposals are scientifically sound, relevant to society's food and agricultural needs, and not duplicative of efforts undertaken elsewhere. Prior to proposals development, alignment of the topic with the needs of the state and the direction of the six program initiatives in the School of Agriculture and Environmental Sciences is determined. Upon agreement by the department chair, the associate dean for research, the research director, and the principal investigator prepare a proposal on the topic for submission through the Evans-Allen program. The merit review process includes a review by five peer reviewers from both within and outside the University who are knowledgeable in or familiar with the area of research. The principal investigator incorporates suggestions made by the reviewers and must give reasons for any substantive suggestions not included or addressed. The proposal is then reviewed by the associate dean for research who determines if additional review and substantive revision is necessary. Upon acceptance by the associate dean for research and research director, the proposal is submitted for budgetary review by the Office of Agricultural Research and then transmitted to NIFA/USDA for approval.

III. Evaluation of Multis & Joint Activities

1. How will the planned programs address the critical issues of strategic importance, including those identified by the stakeholders?

Stakeholder input utilized in determining research directions is also received through numerous Associations. NCARS interacts with 90 official commodity and agricultural industry Associations from

within North Carolina. A College of Agriculture and Life Sciences administrator is appointed as the official liaison for each of these associations and attends at least one, and sometimes more, of their meetings or conferences each year. During these meetings, opinions and facts related to the needs and concerns of that industry sector are obtained through both formal presentations and informal conversations with attendees. The NCARS representative is always introduced early in the meeting so that any individual there can contact them and discuss whatever issues they desire. In addition, the college has employed a Director of Commodity Relations, who reports directly to the Dean and coordinates the activities of the liaisons. This individual also has responsibility for working with any Association that has a need or concern relative to the college's programs, particularly if it might involve any state or federal legislation. For North Carolina Cooperative Extension, there is an established system that 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 throughout 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 actually provide such program input and actions. 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.

2. How will the planned programs address the needs of under-served and under-represented populations of the State(s)?

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. Further, NCARS is committed to seeking, receiving and utilizing input from all stakeholder groups, including under-represented groups and the general public. A significant portion of the input from individuals throughout the state comes from interactions of research scientists with county-based Extension personnel and directly with producers, industry and other agribusiness personnel that represent both underserved audiences as well as more traditional audiences. Both Extension and Research personnel and organizations are intent on reaching all possible citizens where our discoveries and programs can have a positive impact on their quality of life and economic well-being.

3. How will the planned programs describe the expected outcomes and impacts?

The intent for all planned programs and research initiatives is to provide knowledge discovery and dissemination to the state's and nation's citizens. The intent of this effort is to assure that such programs are effective in producing real impacts that enhance the quality of life of our citizens, their environments, and economic well being. Evaluations are made by administrators, policy makers, clients, funding organizations, and the public itself as to whether this intent is proven valid via actual results producing

impacts. The continuous interaction with stakeholders assures that sufficient dialogue and communications are undertaken to produce the needed inputs regarding efficacy of programs and their impacts. Program and personnel evaluations as well as rewards are primarily focused on the efficacy of Research and Extension efforts in producing such desired results and impacts. The intensity of this effort shall continue to grow as even greater emphasis is placed on producing relevant impacts that are of value to society and our population.

4. How will the planned programs result in improved program effectiveness and/or

There is a continuous focus by Research and Extension to maintain relevant programs to address the needs of North Carolina's and the nation's citizens. Internal studies and input from stakeholders and others who are actively involved in an established initiative to assure that program plans are current and relevant to the State's needs. By continuously planning and updating plans of work, as well to assure relevance and an ever increasing emphasis on program impacts and research results is assuring that more efficiencies and effectiveness of our programs produce tangible results. This is an ongoing emphasis that is fully expected to become more pronounced throughout the course of this plan of work and beyond.

IV. Stakeholder Input

1. Actions taken to seek stakeholder input that encourages their participation

- Use of media to announce public meetings and listening sessions
- Targeted invitation to traditional stakeholder groups
- Targeted invitation to non-traditional stakeholder groups
- Targeted invitation to traditional stakeholder individuals
- Targeted invitation to non-traditional stakeholder individuals
- Targeted invitation to selected individuals from general public
- Survey of traditional stakeholder groups
- Survey of traditional stakeholder individuals
- Survey of selected individuals from the general public

Brief explanation.

Extension has an ongoing system of securing stakeholder input in program planning, implementation, and quality assessment has and continues to be a primary commitment for North Carolina Cooperative Extension. An Advisory Leadership System is functional in each of the 100 counties in North Carolina. The system includes an Advisory Council and many specialized committees. The Advisory Council represents geographic, cultural and economic diversity within communities of the county. Its function is to provide overall programmatic review, conduct environmental scans and needs assessment for program direction. These persons represent the diversity of the respective county population to assure the inclusion of under-served populations. While the advisory council will meet quarterly, the specialized committees will meet at least annually to discuss accomplishments and needs still to be addressed. 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 of the North Carolina Cooperative Extension Service at N.C. State University. This group meets quarterly as well as for other 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 SU is also guided by a cadre of citizens who make up the Strategic Planning Council. The Strategic Planning Council includes community leaders, agribusiness persons, representatives from non-governmental organizations, representatives from State Advisory Council, representatives from county based specialized committees

and elected officials. The Strategic Planning Council meets three times a year as a group. Networking and collaboration between the State Advisory Council and the Strategic Planning Council is facilitated by two members who serve on both Councils. Members of each Council periodically meet jointly. With these organized groups functioning as a planned emphasis on significant stakeholder input into program direction, a planned and proactive process is operational that assures that programs are reviewed and overall needs assessed on a continuous basis, but no less than once every two years, with greater frequency encouraged. However, with the functioning of the respective advisory groups on a much more frequent basis, stakeholder inputs are producing a continuous process of program review and adjustments as local needs change. An environmental scanning process is implemented in each of the state's 100 counties. This scanning process helps to assure that a large amount of input is gained from the citizens whom the research and extension efforts are intended to serve.

2(A). A brief statement of the process that will be used by the recipient institution to identify individuals and groups stakeholders and to collect input from them

1. Method to identify individuals and groups

- Use Advisory Committees
- Use Internal Focus Groups
- Use External Focus Groups
- Open Listening Sessions
- Needs Assessments

Brief explanation.

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.

2(B). A brief statement of the process that will be used by the recipient institution to identify individuals and groups who are stakeholders and to collect input from them

1. Methods for collecting Stakeholder Input

Meeting with traditional Stakeholder groups
Survey of traditional Stakeholder groups
Meeting with traditional Stakeholder individuals
Survey of traditional Stakeholder individuals
Meeting specifically with non-traditional groups
Meeting specifically with non-traditional individuals
Meeting with invited selected individuals from the general public

Brief explanation.

This broad variety of collecting stakeholder input led to more than 22,000 citizens of North Carolina involvement in a needs assessment and the development of a new statewide plan of work for Cooperative Extension.As indicated, Research has extensive efforts to gain stakeholder input as well.

3. A statement of how the input will be considered

In the Budget Process
To Identify Emerging Issues
Redirect Extension Programs
In the Staff Hiring Process
In the Action Plans
To Set Priorities

Brief explanation.

Commodity Association members and representatives, County Commissioners, State Legislators, and many other leaders and policy makers have varying influence and interactions regarding program direction, issues identification, budgets and their priorities, staffing and developing plans of actions. This is a huge on-going function that is ingrained in the program planning and implementation for both Research and Extension in North Carolina. It is our intent to involve and serve the citizens of this state in the most effective ways possible to enhance the quality of their lives and economic well-being.

Estimated Number of Professional FTEs/SYs total in the State.

Year	Extension		Research	
	1862	1890	1862	1890
2012	400.0	39.0	425.0	46.0
2013	400.0	39.0	425.0	46.0
2014	400.0	39.0	425.0	46.0
2015	400.0	39.0	425.0	46.0
2016	400.0	39.0	425.0	46.0

II. Merit Review Process

1. The Merit Review Process that will be Employed during the 5-Year POW Cycle

- ☑ Internal University Panel
- ☑ External University Panel
- ☐ External Non-University Panel
- ☑ Combined External and Internal University Panel
- ☑ Combined External and Internal University External Non-University Panel
- ☑ Expert Peer Review
- ☐ Other

2. Brief Explanation

For NCARS, a thorough scientific and merit review of each proposed new or revised research project is made at the departmental level prior to submission to the NCARS office. This departmental review should consist of two parts: an informal review (PI's responsibility) and a formal review (Department Head's responsibility). Cooperative Extension's work is closely 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 300 Extension faculty within CALS have joint appointments with NCARS, collaborating with nearly 500 Extension agents who plan and deliver educational programs across the State. This effort is further strengthened by the Extension programmatic efforts of NCA&T agents and faculty who collaborate with researchers at NCA&T as well as to use the collaborative program efforts inherent in joint and individualized programming efforts. In addition to this alliance with research faculty at both institutions, 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. Stakeholder input undergirds all of Extension's efforts, as it has and continues to do in planning and implementing the new AREERA Plan of Work.

III. Evaluation of Multis & Joint Activities

1. How will the planned programs address the critical issues of strategic importance, including those identified by the stakeholders?

Stakeholder input utilized in determining research directions is also received through numerous Associations. NCARS interacts with 90 official commodity, and agricultural industry Associations from within North Carolina. A College of Agriculture and Life Sciences administrator is appointed as the official liaison for each of these associations and attends at least one, and sometimes more, of their meetings or conferences each year. During these meetings, opinions and facts related to the needs and concerns of that industry sector are obtained through both formal presentations and informal conversations with attendees. The NCARS representative is always introduced early in the meeting so that any individual there can contact them and discuss whatever issues they desire. In addition, the college has employed a Director of Commodity Relations, who reports directly to the Dean and coordinates the activities of the liaisons. This individual also has responsibility for working with any Association that has a need or concern relative to the college's programs, particularly if it might involve any state or federal legislation. For North Carolina Cooperative Extension, there is an established system that 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

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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.Further, The North Carolina Agricultural Research Service (NCARS) is committed to seeking, receiving and utilizing input from all stakeholder groups, including under-represented groups and the general public. A significant portion of the input from individuals throughout the state comes from interactions of research scientists with county-based Extension personnel and directly with producers, industry and other agribusiness personnel that represent both underserved audiences as well as more traditional audiences.Both Extension and Research personnel and organizations are intent on reaching all possible citizens where our discoveries and programs can have a positive impact on their quality of life and economic well-being.

3. How will the planned programs describe the expected outcomes and impacts?

The intent for all planned programs and research initiatives is to provide knowledge discovery and dissemination to the state's and nation's citizens. The intent of this effort is to assure that such programs are effective in producing real impacts that do enhance the quality of life of our citizens, their environment, and economic well being. Evaluations are made by administrators, policy makers, clients, funding organizations, and the public itself as to whether this intent is proven valid via actual results producing impacts. The continuous interaction with stakeholders assures that sufficient dialogue and communications are undertaken to produce the needed inputs regarding efficacy of programs and their impacts. Program and personnel evaluations as well as rewards are primarily focused on the efficacy of Research and Extension efforts in producing such desired results and impacts. The intensity of this effort shall continue to grow as even greater emphasis is placed on producing relevant impacts that are of value to society and our population.

4. How will the planned programs result in improved program effectiveness and/or

There is a continuous focus by Research and Extension to maintain relevant programs to address the needs of North Carolina's and the nation's citizens. Internal studies and input from stakeholders and others who are actively involved in an established initiative to assure that program plans are current and relevant to the State's needs. By continuously planning and updating plans of work, as well to assure relevance and an ever increasing emphasis on program impacts and research results is assuring that more efficiencies and effectiveness of our programs produce tangible results. This is an ongoing emphasis that is fully expected to become more pronounced throughout the course of this plan of work and beyond.

IV. Stakeholder Input

1. Actions taken to seek stakeholder input that encourages their participation

- ☑ Use of media to announce public meetings and listening sessions
- ☑ Targeted invitation to traditional stakeholder groups
- ☑ Targeted invitation to non-traditional stakeholder groups
- ☑ Targeted invitation to traditional stakeholder individuals
- ☑ Targeted invitation to non-traditional stakeholder individuals
- ☑ Targeted invitation to selected individuals from general public
- ☑ Survey of traditional stakeholder groups
- ☑ Survey of traditional stakeholder individuals
- ☐ Survey of the general public
- ☐ Survey specifically with non-traditional groups
- ☐ Survey specifically with non-traditional individuals
- ☑ Survey of selected individuals from the general public
- ☐ Other

Brief explanation.

Extension has an ongoing system of securing stakeholder input in program planning, implementation, and quality assessment has and continues to be a primary commitment for North Carolina Cooperative Extension. An Advisory Leadership System is functional in each of the 100 counties in North Carolina. The system includes an Advisory Council and many specialized committees. The Advisory Council represents geographic, cultural and economic diversity within communities of the county. Its function is to provide overall programmatic review, conduct environmental scans and needs assessment for program direction. These persons represent the diversity of the respective county population to assure the inclusion of under-served populations. While the advisory council will meet quarterly, the specialized committees will meet at least annually to discuss accomplishments and needs still to be addressed. 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 of the North Carolina Cooperative Extension Service at N.C. State University. This group meets quarterly as well as for other 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 SU is also guided by a cadre of citizens who make up the Strategic Planning Council. The Strategic Planning Council includes community leaders, agribusiness persons, representatives from non-governmental organizations, representatives from State Advisory Council, representatives from county based specialized committees and elected officials. The Strategic Planning Council meets three times a year as a group. Networking and collaboration between the State Advisory Council and the Strategic Planning Council is facilitated by two members who serve on both Councils. Members of each Council periodically meet jointly. With these organized groups functioning as a planned emphasis on significant stakeholder input into program direction, a planned and proactive process is operational that assures that programs are reviewed and overall needs assessed on a continuous basis, but no less than once every two years, with greater frequency encouraged. However, with the functioning of the respective advisory groups

on a much more frequent basis, stakeholder inputs are producing a continuous process of program review and adjustments as local needs change. An environmental scanning process is implemented in each of the state's 100 counties. This scanning process helps to assure that a large amount of input is gained from the citizens whom the research and extension efforts are intended to serve.

2(A). A brief statement of the process that will be used by the recipient institution to identify individuals and groups stakeholders and to collect input from them

1. Method to identify individuals and groups

- ☑ Use Advisory Committees
- ☑ Use Internal Focus Groups
- ☑ Use External Focus Groups
- ☑ Open Listening Sessions
- ☑ Needs Assessments
- ☐ Use Surveys
- ☐ Other

Brief explanation.

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.

2(B). A brief statement of the process that will be used by the recipient institution to identify individuals and groups who are stakeholders and to collect input from them

1. Methods for collecting Stakeholder Input

- ☑ Meeting with traditional Stakeholder groups
- ☑ Survey of traditional Stakeholder groups
- ☑ Meeting with traditional Stakeholder individuals
- ☑ Survey of traditional Stakeholder individuals
- ☐ Meeting with the general public (open meeting advertised to all)
- ☐ Survey of the general public
- ☑ Meeting specifically with non-traditional groups
- ☐ Survey specifically with non-traditional groups
- ☑ Meeting specifically with non-traditional individuals
- ☐ Survey specifically with non-traditional individuals
- ☑ Meeting with invited selected individuals from the general public
- ☐ Survey of selected individuals from the general public
- ☐ Other

Brief explanation.

This broad variety of collecting stakeholder input led to more than 22,000 citizens of North Carolina involvement in a needs assessment and the development of a new statewide plan of work for Cooperative Extension.As indicated, Research has extensive efforts to gain stakeholder input as well.

3. A statement of how the input will be considered

- ☑ In the Budget Process
- ☑ To Identify Emerging Issues
- ☑ Redirect Extension Programs
- ☐ Redirect Research Programs
- ☑ In the Staff Hiring Process
- ☑ In the Action Plans
- ☑ To Set Priorities
- ☐ Other

Brief explanation.

Commodity Association members and representatives, County Commissioners, State Legislators, and many other leaders and policy makers have varying influence and interactions regarding program direction, issues identification, budgets and their priorities, staffing and developing plans of actions. This is a huge on-going function that is ingrained in the program planning and implementation for both Research and Extension in North Carolina. It is our intent to involve and serve the citizens of this state in the most effective ways possible to enhance the quality of their lives and economic well-being.

V. Planned Program Table of Content

S. No.	PROGRAM NAME
1	Global Food Security - Plant Production Systems and Health
2	Global Food Security - Animals and Their Systems, Production and Health
3	Climate Change
4	Sustainable Energy including Biotechnology
5	Childhood Obesity
6	Food Safety - Food Production Systems: Development, Processing and Quality
7	Human and Community Development- Youth Development and Families
8	Human Health, Nutrition and Well-being

V(A). Planned Program (Summary)

Program # 1

1. Name of the Planned Program

Global Food Security - Plant Production Systems and Health

2. Brief summary about Planned Program

North Carolina's agricultural economy has become more diverse to meet the demands of a changing population and market opportunities. Over 80 crops with an annual market value of nearly $3 billion are produced commercially. Growers have diversified into many specialty crops including medicinal herbs, specialty melons, heirloom fruits and vegetables, various crops for the state's growing Hispanic and Oriental populations, mushrooms,kenaf, sea oats and wine grapes as well as organic production of various fruits and vegetables. This diversification has placed demands on the NCARS to develop sustainable programs for producing, protecting, harvesting, storing, and marketing these commodities, as well as Cooperative Extension to assure that appropriate audiences are adequately educated to use the latest developments. This program focuses on research and extension programs that address needs of NCgrowers which will allow them to remain competitive in a national and global agricultural economy and take advantage of local marketing opportunities through more efficient production practices and diversification to alternative and specialty crops.

Farmers, including limited resource farmers, who grow vegetables as well as other crops and can increase their income quite significantly by proper use of pesticides. The use of pesticides in food production is very widespread and is often driven by the demand for blemish-free produce.
Producing crops that are safe to consumers and the environment can be accomplished through the enhancement of the practice of Integrated Pest Management (IPM). Researchers will also investigate agroforestry as a means of integration of working trees on farms to provide ecosystem services, protect natural resources, sequester carbon, provide wild-life habitat and shade, ameliorate soil quality, and pump back percolated nutrients.

Additional research will focus on innovation in row crop production strategies and systems especially those used for biofuels; identification, selection, breeding, introgression and genomics designed to develop improved varieties with superior disease resistance and quality and varieties with the ability to produce high value constituents; structural, systems and quantitative biology using the tools of metabolomics and bioinformatics; value added agricultural and biological systems; horticultural and green industry production systems; and novel ways to manage pests in integrated systems. As a result of the changes in NCagriculture there are an expanding number of new or inexperienced producers which creates increased education needs and opportunities for production and marketing information. Many of the projects within this program area fully integrate research and extension activities to develop and deliver educational programs to full-time, and limited-resource farmers, to agribusiness, and to the nonfarm public. Scientists in other discovery-oriented projects work in conjunction with field faculty to bring new knowledge and technology to producers and agribusinesses through development, field testing and demonstration..

3. Program existence :

- ○ New (One year or less)
- ◉ Intermediate (One to five years)
- ○ Mature (More than five years)

4. Program duration :

- ○ Short-Term(One year or less)
- ○ Medium-Term (One to five years)
- ◉ Long-Term (More than five years)

5. Expending formula funds or state-matching funds :

- ◉ Yes
- ○ No

6. Expending other than formula funds or state-matching funds :

- ◉ Yes
- ○ No

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
201	Plant Genome, Genetics, and Genetic Mechanisms	10%	10%	10%	20%
202	Plant Genetic Resources	10%	10%	10%	10%
204	Plant Product Quality and Utility (Preharvest)	5%	5%	5%	10%
205	Plant Management Systems	10%	20%	15%	20%
206	Basic Plant Biology	10%	10%	10%	20%
211	Insects, Mites, and Other Arthropods Affecting Plants	10%	10%	10%	10%
212	Pathogens and Nematodes Affecting Plants	10%	15%	10%	0%
213	Weeds Affecting Plants	12%	15%	10%	0%
216	Integrated Pest Management Systems	5%	5%	5%	10%
404	Instrumentation and Control Systems	1%	0%	0%	0%
511	New and Improved Non-Food Products and Processes	1%	0%	0%	0%
512	Quality Maintenance in Storing and Marketing Non-Food Products	1%	0%	0%	0%
601	Economics of Agricultural Production and Farm Management	6%	0%	5%	0%
602	Business Management, Finance, and Taxation	3%	0%	5%	0%
604	Marketing and Distribution Practices	6%	0%	5%	0%
	Total	100%	100%	100%	100%

V(C). Planned Program (Situation and Scope)

1. Situation and priorities

Although North Carolina has a strong agricultural economy in order to remain competitive nationally and globally, it is necessary for producers to become more efficient in the production of traditional crops and those used in the production of biofuels and diversify their operations to incorporate alternative and specialty crops in their mix. In recent years volatility in commodity grain markets and pressures exerted on tobacco production have resulted in the redirection of programs to explore and examine diversification of crop production in North Carolina with alternative and specialty crops. These crops range from those that have nutraceutical and/or pharmaceutical value to crops that have potential for use as biofuels to those for ethnic markets. Each provides great opportunities as well as challenges. Additionally, economic downturns in agronomic crops other than tobacco and sensitivity to environmental concerns regarding pesticides, nutrients and agricultural wastes have increased the need for more sustainable production practices for large as well as limited resource farmers. Furthermore, consumers have become more educated and food safety, quality, and nutrition are concerns of many people. The vast majority of Americans still consumes

conventionally-grown crops, and the small growers who account for a substantial amount of the vegetables that Americans consume must be given increased attention in order to make production of produce more sustainable and safer to growers, consumers and the environment. It is therefore incumbent upon our producers to supply a quality, nutritious and safe product to the market place. In order to develop competitive and sustainable agricultural systems we must explore and develop new technologies that can be used by all members of the farming community. It is also essential that we use the powers of genomics, proteomics, and metabolomics to better understand the mechanisms that underlie pest resistance, enhanced yield, drought tolerance, salt tolerance and other stresses in order to develop new varieties for traditional and specialty markets. Other strategies like the use of agroforestry and high tunnels has allowed growers to expand the growing season into late fall and early spring. The long term outcome will be organic crops that are profitably produced in high tunnels with trees providing extra income and ecosystem services. Changes in agricultural production, changes in government policies and regulations, the increased use of genetically modified crops, and changes in demographics all challenge the NCARS and NCCE, which includes Extension educational programs supported at both NC A&T and NCSU to continue to develop and deliver educational programs to full-time, part-time and limited resource farmers, to agribusiness, and the non-farm public to ensure a productive agriculture that is competitive in the global economy and that can continue to contribute to the state's economy and the way of life of its citizens.

2. Scope of the Program

- ☑ In-State Extension
- ☑ In-State Research
- ☑ Multistate Research
- ☑ Multistate Extension
- ☑ Integrated Research and Extension
- ☑ Multistate Integrated Research and Extension

V(D). Planned Program (Assumptions and Goals)

1. Assumptions made for the Program

- There will be continued funding at the state and federal level for applied research on sustainable production systems and basic research on the mechanisms that underlie crop productivity and pest resistance.
- There will be continued funding and support for extension faculty and county faculty to deliver programs to producers and other clientele.
- The agricultural economy will remain strong and provide a climate to support agricultural research and extension programs.

2. Ultimate goal(s) of this Program

The ultimate goal of this program is to develop sustainable production systems for traditional as well as new crops that will ensure a healthy and viable agricultural economy and rural environment for all segments of the farming community. The realization of this goal will be predicated on basic research that will expand our knowledge on the mechanisms that underlie plant productivity and develop new technologies and applied research that will incorporate the findings of this research into sustainable production systems farmers in North Carolina.

V(E). Planned Program (Inputs)

1. Estimated Number of professional FTE/SYs to be budgeted for this Program

Year	Extension		Research	
	1862	1890	1862	1890
2012	102.0	9.0	160.0	7.0
2013	102.0	9.0	160.0	7.0
2014	102.0	9.0	160.0	7.0
2015	102.0	9.0	160.0	7.0
2016	102.0	9.0	160.0	7.0

V(F). Planned Program (Activity)

1. Activity for the Program

•Conduct discovery research on plants and plant systems using tools genomics, metabolomics, and proteomics

- Develop improved crop varieties using traditional and genomic approaches
- Introduce/discover new plants for food use and the green industry
- Develop systems for production of plants for biofuels
- Seek new uses for plants and plant byproducts
- Develop production systems for organic farmers
- Develop diagnostic techniques for indigenous and introduced pathogens
- Partner with industry
- Develop sustainable production systems for both large scale and limited resource farmers
- Enhance IPM programs through new techniques and strategies
- Set up applied research/demonstration plots
- Write papers for scientific community
- Prepare publications for grower and homeowner audiences
- Develop web sites to deliver information to grower and homeowner audiences
- Conduct workshops, meetings, and other focused educational programs for farmers, commodity groups, and industry.

2. Type(s) of methods to be used to reach direct and indirect contacts

Extension

Direct Methods	Indirect Methods
☑ Education Class	☐ Public Service Announcement
☑ Workshop	☐ Billboards
☑ Group Discussion	☑ Newsletters
☑ One-on-One Intervention	☑ TV Media Programs
☑ Demonstrations	☑ Web sites
☑ Other 1 (Tours)	☑ Other 1 (Newsletters)
☑ Other 2 (Conferences)	☑ Other 2 (Fact sheets)

3. Description of targeted audience

- The scientific community
- Regulatory agencies
- Agricultural chemical companies
- Agribusiness
- Commercial and limited resource farmers
- New and Part-time farmers
- Homeowners
- Consultants
- News media
- General public
- Non-governmental organizations
- Other public agency staff

V(G). Planned Program (Outputs)

1. Standard output measures

Target for the number of persons(contacts) to be reached through direct and indirect contact

	Direct Contact Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Year	Target	Target	Target	Target
2012	352000	1200000	22950	23600
2013	352000	1200000	23000	23600
2014	352000	1200000	23000	23600
2015	352000	1200000	23000	23600
2016	352000	1200000	23000	23600

2. (Standard Research Target) Number of Patent Applications Submitted

2012:9 **2013:**9 **2014:**10 **2015:**14 **2016:**14

3. Expected Peer Review Publications

Year	Research Target	Extension Target	Total
2012	357	110	467
2013	360	110	470
2014	365	110	475
2015	355	110	465
2016	355	110	465

V(H). State Defined Outputs

1. Output Target

- Studies conducted to identify new germplasm and develop new and improved varieties of crops and ornamentals

  2012:32 **2013:**32 **2014:**32 **2015:**32 **2016:**32

- Clients to receive plant information via printed publications, fax, e-mails, phone and other contacts via known non-face to face delivery means.

  2012:373000 **2013:**373000 **2014:**373000 **2015:**373000 **2016:**373000

- Educate growers and other clientele through highly focused non-degree credit workshops and other formalized group educational sessions.

  2012:1500 **2013:**1500 **2014:**1500 **2015:**1500 **2016:**1500

V(I). State Defined Outcome

O. No	Outcome Name
1	Increased Income as a Result of Production of New or Alternative Crops/Enterprises
2	Increased profit through the adoption of improved nutrient management practices
3	Number of releases of germplasm and varieties with improved yield potential and other qualities
4	New techniques and products developed and released that can be commercialized
5	Increased profit through the adoption of new production practices
6	More informed growers through highly focused non-degree credit workshops and other formalized group educational sessions.
7	Increased acreage of organic crops and specialty crops.
8	Number of discoveries of mechanisms that regulate the productivity of plants and the microorganisms that interact with them
9	Increased profit through the adoption of new production practices *and marketing locally*
10	New organic, farmers and agritourism markets established by individual entrepreneurs
11	Growers Adopting Improved Business Management Practices

Outcome # 1

1. Outcome Target

Increased Income as a Result of Production of New or Alternative Crops/Enterprises

2. Outcome Type :

- (●) Change in Knowledge Outcome Measure
- ( ) Change in Action Outcome Measure
- ( ) Change in Condition Outcome Measure

2012:1060000 **2013:**1060000 **2014:**1060000 **2015:**1070000 **2016:**1070000

3. Associated Knowledge Area(s)

- ☑ 201 - Plant Genome, Genetics, and Genetic Mechanisms
- ☐ 202 - Plant Genetic Resources
- ☑ 204 - Plant Product Quality and Utility (Preharvest)
- ☑ 205 - Plant Management Systems
- ☐ 206 - Basic Plant Biology
- ☑ 211 - Insects, Mites, and Other Arthropods Affecting Plants
- ☑ 212 - Pathogens and Nematodes Affecting Plants
- ☑ 213 - Weeds Affecting Plants
- ☑ 216 - Integrated Pest Management Systems
- ☐ 404 - Instrumentation and Control Systems
- ☐ 511 - New and Improved Non-Food Products and Processes
- ☐ 512 - Quality Maintenance in Storing and Marketing Non-Food Products
- ☐ 601 - Economics of Agricultural Production and Farm Management
- ☐ 602 - Business Management, Finance, and Taxation
- ☐ 604 - Marketing and Distribution Practices

4. Associated Institute Type(s)

- ☑ 1862 Extension
- ☑ 1862 Research
- ☑ 1890 Extension
- ☑ 1890 Research

Outcome # 2

1. Outcome Target

Increased profit through the adoption of improved nutrient management practices

2. Outcome Type :

- (●) Change in Knowledge Outcome Measure
- ( ) Change in Action Outcome Measure
- ( ) Change in Condition Outcome Measure

2012:3100000 **2013:**3100000 **2014:**3100000 **2015:**3100000 **2016:**3100000

3. Associated Knowledge Area(s)

- ☐ 201 - Plant Genome, Genetics, and Genetic Mechanisms
- ☑ 202 - Plant Genetic Resources
- ☐ 204 - Plant Product Quality and Utility (Preharvest)
- ☑ 205 - Plant Management Systems
- ☐ 206 - Basic Plant Biology
- ☑ 211 - Insects, Mites, and Other Arthropods Affecting Plants
- ☑ 212 - Pathogens and Nematodes Affecting Plants
- ☑ 213 - Weeds Affecting Plants
- ☐ 216 - Integrated Pest Management Systems
- ☐ 404 - Instrumentation and Control Systems
- ☐ 511 - New and Improved Non-Food Products and Processes
- ☐ 512 - Quality Maintenance in Storing and Marketing Non-Food Products
- ☐ 601 - Economics of Agricultural Production and Farm Management
- ☐ 602 - Business Management, Finance, and Taxation
- ☐ 604 - Marketing and Distribution Practices

4. Associated Institute Type(s)

- ☑ 1862 Extension
- ☑ 1862 Research
- ☑ 1890 Extension
- ☑ 1890 Research

Outcome # 3

1. Outcome Target

Number of releases of germplasm and varieties with improved yield potential and other qualities

2. Outcome Type :

- ○ Change in Knowledge Outcome Measure
- ○ Change in Action Outcome Measure
- ◉ Change in Condition Outcome Measure

2012:28 **2013:**28 **2014:**28 **2015:**30 **2016:**30

3. Associated Knowledge Area(s)

- ☑ 201 - Plant Genome, Genetics, and Genetic Mechanisms
- ☑ 202 - Plant Genetic Resources
- ☐ 204 - Plant Product Quality and Utility (Preharvest)
- ☐ 205 - Plant Management Systems
- ☑ 206 - Basic Plant Biology
- ☐ 211 - Insects, Mites, and Other Arthropods Affecting Plants
- ☑ 212 - Pathogens and Nematodes Affecting Plants
- ☐ 213 - Weeds Affecting Plants
- ☐ 216 - Integrated Pest Management Systems
- ☐ 404 - Instrumentation and Control Systems
- ☐ 511 - New and Improved Non-Food Products and Processes
- ☐ 512 - Quality Maintenance in Storing and Marketing Non-Food Products
- ☐ 601 - Economics of Agricultural Production and Farm Management
- ☐ 602 - Business Management, Finance, and Taxation
- ☐ 604 - Marketing and Distribution Practices

4. Associated Institute Type(s)

- ☐ 1862 Extension
- ☑ 1862 Research
- ☐ 1890 Extension
- ☑ 1890 Research

Outcome # 4

1. Outcome Target

New techniques and products developed and released that can be commercialized

2. Outcome Type :

- ○ Change in Knowledge Outcome Measure
- ○ Change in Action Outcome Measure
- ◉ Change in Condition Outcome Measure

2012:10 **2013:**10 **2014:**10 **2015:**10 **2016:**10

3. Associated Knowledge Area(s)

- ☑ 201 - Plant Genome, Genetics, and Genetic Mechanisms
- ☑ 202 - Plant Genetic Resources
- ☑ 204 - Plant Product Quality and Utility (Preharvest)
- ☐ 205 - Plant Management Systems
- ☑ 206 - Basic Plant Biology
- ☐ 211 - Insects, Mites, and Other Arthropods Affecting Plants
- ☑ 212 - Pathogens and Nematodes Affecting Plants
- ☐ 213 - Weeds Affecting Plants
- ☐ 216 - Integrated Pest Management Systems
- ☐ 404 - Instrumentation and Control Systems
- ☐ 511 - New and Improved Non-Food Products and Processes
- ☐ 512 - Quality Maintenance in Storing and Marketing Non-Food Products
- ☐ 601 - Economics of Agricultural Production and Farm Management
- ☐ 602 - Business Management, Finance, and Taxation
- ☐ 604 - Marketing and Distribution Practices

4. Associated Institute Type(s)

- ☐ 1862 Extension
- ☑ 1862 Research
- ☐ 1890 Extension
- ☑ 1890 Research

Outcome # 5

1. Outcome Target

Increased profit through the adoption of new production practices

2. Outcome Type :

- ○ Change in Knowledge Outcome Measure
- ◉ Change in Action Outcome Measure
- ○ Change in Condition Outcome Measure

2012:33000000 **2013:**33000000 **2014:**33000000 **2015:**33000000 **2016:**33000000

3. Associated Knowledge Area(s)

- ☐ 201 - Plant Genome, Genetics, and Genetic Mechanisms
- ☐ 202 - Plant Genetic Resources
- ☑ 204 - Plant Product Quality and Utility (Preharvest)
- ☑ 205 - Plant Management Systems
- ☐ 206 - Basic Plant Biology
- ☑ 211 - Insects, Mites, and Other Arthropods Affecting Plants
- ☑ 212 - Pathogens and Nematodes Affecting Plants
- ☑ 213 - Weeds Affecting Plants
- ☑ 216 - Integrated Pest Management Systems
- ☐ 404 - Instrumentation and Control Systems
- ☐ 511 - New and Improved Non-Food Products and Processes
- ☐ 512 - Quality Maintenance in Storing and Marketing Non-Food Products
- ☐ 601 - Economics of Agricultural Production and Farm Management
- ☐ 602 - Business Management, Finance, and Taxation
- ☐ 604 - Marketing and Distribution Practices

4. Associated Institute Type(s)

- ☑ 1862 Extension
- ☑ 1862 Research
- ☑ 1890 Extension
- ☑ 1890 Research

Outcome # 6

1. Outcome Target

More informed growers through highly focused non-degree credit workshops and other formalized group educational sessions.

2. Outcome Type :

- (●) Change in Knowledge Outcome Measure
- ( ) Change in Action Outcome Measure
- ( ) Change in Condition Outcome Measure

2012:76000 **2013:**76000 **2014:**76000 **2015:**80000 **2016:**80000

3. Associated Knowledge Area(s)

- ☐ 201 - Plant Genome, Genetics, and Genetic Mechanisms
- ☐ 202 - Plant Genetic Resources
- ☑ 204 - Plant Product Quality and Utility (Preharvest)
- ☑ 205 - Plant Management Systems
- ☐ 206 - Basic Plant Biology
- ☑ 211 - Insects, Mites, and Other Arthropods Affecting Plants
- ☑ 212 - Pathogens and Nematodes Affecting Plants
- ☑ 213 - Weeds Affecting Plants
- ☑ 216 - Integrated Pest Management Systems
- ☐ 404 - Instrumentation and Control Systems
- ☐ 511 - New and Improved Non-Food Products and Processes
- ☐ 512 - Quality Maintenance in Storing and Marketing Non-Food Products
- ☐ 601 - Economics of Agricultural Production and Farm Management
- ☐ 602 - Business Management, Finance, and Taxation
- ☐ 604 - Marketing and Distribution Practices

4. Associated Institute Type(s)

- ☑ 1862 Extension
- ☐ 1862 Research
- ☑ 1890 Extension
- ☑ 1890 Research

Outcome # 7

1. Outcome Target

Increased acreage of organic crops and specialty crops.

2. Outcome Type :

- ○ Change in Knowledge Outcome Measure
- ◉ Change in Action Outcome Measure
- ○ Change in Condition Outcome Measure

2012:2000 **2013:**2000 **2014:**2000 **2015:**2500 **2016:**2500

3. Associated Knowledge Area(s)

- ☐ 201 - Plant Genome, Genetics, and Genetic Mechanisms
- ☐ 202 - Plant Genetic Resources
- ☑ 204 - Plant Product Quality and Utility (Preharvest)
- ☑ 205 - Plant Management Systems
- ☐ 206 - Basic Plant Biology
- ☑ 211 - Insects, Mites, and Other Arthropods Affecting Plants
- ☐ 212 - Pathogens and Nematodes Affecting Plants
- ☑ 213 - Weeds Affecting Plants
- ☑ 216 - Integrated Pest Management Systems
- ☐ 404 - Instrumentation and Control Systems
- ☐ 511 - New and Improved Non-Food Products and Processes
- ☐ 512 - Quality Maintenance in Storing and Marketing Non-Food Products
- ☐ 601 - Economics of Agricultural Production and Farm Management
- ☐ 602 - Business Management, Finance, and Taxation
- ☐ 604 - Marketing and Distribution Practices

4. Associated Institute Type(s)

- ☑ 1862 Extension
- ☐ 1862 Research
- ☑ 1890 Extension
- ☐ 1890 Research

Outcome # 8

1. Outcome Target

Number of discoveries of mechanisms that regulate the productivity of plants and the microorganisms that interact with them

2. Outcome Type :

- ○ Change in Knowledge Outcome Measure
- ◉ Change in Action Outcome Measure
- ○ Change in Condition Outcome Measure

2012:26 **2013:**26 **2014:**26 **2015:**30 **2016:**30

3. Associated Knowledge Area(s)

- ☑ 201 - Plant Genome, Genetics, and Genetic Mechanisms
- ☑ 202 - Plant Genetic Resources
- ☑ 204 - Plant Product Quality and Utility (Preharvest)
- ☐ 205 - Plant Management Systems
- ☑ 206 - Basic Plant Biology
- ☐ 211 - Insects, Mites, and Other Arthropods Affecting Plants
- ☑ 212 - Pathogens and Nematodes Affecting Plants
- ☐ 213 - Weeds Affecting Plants
- ☐ 216 - Integrated Pest Management Systems
- ☐ 404 - Instrumentation and Control Systems
- ☐ 511 - New and Improved Non-Food Products and Processes
- ☐ 512 - Quality Maintenance in Storing and Marketing Non-Food Products
- ☐ 601 - Economics of Agricultural Production and Farm Management
- ☐ 602 - Business Management, Finance, and Taxation
- ☐ 604 - Marketing and Distribution Practices

4. Associated Institute Type(s)

- ☐ 1862 Extension
- ☑ 1862 Research
- ☐ 1890 Extension
- ☑ 1890 Research

Outcome # 9

1. Outcome Target

Increased profit through the adoption of new production practices *and marketing locally*

2. Outcome Type :

- (●) Change in Knowledge Outcome Measure
- ( ) Change in Action Outcome Measure
- ( ) Change in Condition Outcome Measure

2012:0 **2013:**0 **2014:**0 **2015:**15 **2016:**15

3. Associated Knowledge Area(s)

- ☐ 201 - Plant Genome, Genetics, and Genetic Mechanisms
- ☐ 202 - Plant Genetic Resources
- ☐ 204 - Plant Product Quality and Utility (Preharvest)
- ☑ 205 - Plant Management Systems
- ☐ 206 - Basic Plant Biology
- ☐ 211 - Insects, Mites, and Other Arthropods Affecting Plants
- ☐ 212 - Pathogens and Nematodes Affecting Plants
- ☐ 213 - Weeds Affecting Plants
- ☐ 216 - Integrated Pest Management Systems
- ☐ 404 - Instrumentation and Control Systems
- ☐ 511 - New and Improved Non-Food Products and Processes
- ☐ 512 - Quality Maintenance in Storing and Marketing Non-Food Products
- ☐ 601 - Economics of Agricultural Production and Farm Management
- ☐ 602 - Business Management, Finance, and Taxation
- ☐ 604 - Marketing and Distribution Practices

4. Associated Institute Type(s)

- ☑ 1862 Extension
- ☐ 1862 Research
- ☑ 1890 Extension
- ☐ 1890 Research

Outcome # 10

1. Outcome Target

New organic, farmers and agritourism markets established by individual entrepreneurs

2. Outcome Type :

- ○ Change in Knowledge Outcome Measure
- ◉ Change in Action Outcome Measure
- ○ Change in Condition Outcome Measure

2012:250 **2013:**250 **2014:**250 **2015:**250 **2016:**250

3. Associated Knowledge Area(s)

- ☐ 201 - Plant Genome, Genetics, and Genetic Mechanisms
- ☐ 202 - Plant Genetic Resources
- ☐ 204 - Plant Product Quality and Utility (Preharvest)
- ☐ 205 - Plant Management Systems
- ☐ 206 - Basic Plant Biology
- ☐ 211 - Insects, Mites, and Other Arthropods Affecting Plants
- ☐ 212 - Pathogens and Nematodes Affecting Plants
- ☐ 213 - Weeds Affecting Plants
- ☐ 216 - Integrated Pest Management Systems
- ☐ 404 - Instrumentation and Control Systems
- ☑ 511 - New and Improved Non-Food Products and Processes
- ☐ 512 - Quality Maintenance in Storing and Marketing Non-Food Products
- ☑ 601 - Economics of Agricultural Production and Farm Management
- ☑ 602 - Business Management, Finance, and Taxation
- ☑ 604 - Marketing and Distribution Practices

4. Associated Institute Type(s)

- ☑ 1862 Extension
- ☐ 1862 Research
- ☑ 1890 Extension
- ☐ 1890 Research

Outcome # 11

1. Outcome Target

Growers Adopting Improved Business Management Practices

2. Outcome Type :

- ○ Change in Knowledge Outcome Measure
- ◉ Change in Action Outcome Measure
- ○ Change in Condition Outcome Measure

2012:500 **2013:**500 **2014:**500 **2015:**500 **2016:**500

3. Associated Knowledge Area(s)

- ☐ 201 - Plant Genome, Genetics, and Genetic Mechanisms
- ☐ 202 - Plant Genetic Resources
- ☐ 204 - Plant Product Quality and Utility (Preharvest)
- ☐ 205 - Plant Management Systems
- ☐ 206 - Basic Plant Biology
- ☐ 211 - Insects, Mites, and Other Arthropods Affecting Plants
- ☐ 212 - Pathogens and Nematodes Affecting Plants
- ☐ 213 - Weeds Affecting Plants
- ☐ 216 - Integrated Pest Management Systems
- ☐ 404 - Instrumentation and Control Systems
- ☐ 511 - New and Improved Non-Food Products and Processes
- ☐ 512 - Quality Maintenance in Storing and Marketing Non-Food Products
- ☑ 601 - Economics of Agricultural Production and Farm Management
- ☑ 602 - Business Management, Finance, and Taxation
- ☑ 604 - Marketing and Distribution Practices

4. Associated Institute Type(s)

- ☑ 1862 Extension
- ☐ 1862 Research
- ☑ 1890 Extension
- ☐ 1890 Research

V(J). Planned Program (External Factors)

1. External Factors which may affect Outcomes

- ☑ Natural Disasters (drought, weather extremes, etc.)
- ☑ Economy
- ☑ Appropriations changes
- ☑ Public Policy changes

- ☑ Government Regulations
- ☑ Competing Public priorities
- ☑ Competing Programmatic Challenges
- ☐ Populations changes (immigration, new cultural groupings, etc.)
- ☐ Other

Description

Changes in both competitive and noncompetitive funding will greatly influence our ability to conduct the planned research as well as deliver the results to our stakeholders. Similarly changes in policy and government regulations that affect the regulation of transgenic plants, environmental regulations, and pesticide registrations can greatly influence the direction of the research programs. The introduction of an exotic pest could greatly influence the direction of research programs. Field research could be significantly impacted by natural disasters such as hurricanes.

V(K). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

- ☑ After Only (post program)
- ☑ Retrospective (post program)
- ☑ Before-After (before and after program)
- ☑ During (during program)
- ☐ Time series (multiple points before and after program)
- ☐ Case Study
- ☐ Comparisons between program participants (individuals, group, organizations) and non-participants
- ☐ Comparisons between different groups of individuals or program participants experiencing different levels of program intensity.
- ☐ Comparison between locales where the program operates and sites without program intervention
- ☐ Other

Description

Some research studies and extension activities have formal evaluation protocols to establish base-line data. An example would be IPM programs where an initial assessment of pesticide use is necessary to determine the impact of the program. Similar, baseline studies on pest resistance to pesticides are necessary to determine if resistance management techniques are effective in preventing the development of resistance. The success of research programs is measured by peer reviewed publications. Measures such as the Science Citation Index are used to assess the impact of these publications.

2. Data Collection Methods

- ☑ Sampling
- ☐ Whole population

Survey (Mail, Telephone, On-Site).

- ☑ Mail

- ☑ Telephone
- ☑ On-Site

Interview

- ☑ Structured
- ☑ Unstructured

☐ Case Study

☑ Observation

☐ Portfolio Reviews

☐ Tests

☐ Journals

☐ Other

Description

Methods of data collection will vary among the individual research projects within this Planned Program. Extension activities use various measures including (i)meetings with traditional Stakeholder groups, (ii)surveys of traditional Stakeholder groups, (iii) meetings with traditional Stakeholder individuals, (iv) surveys of traditional Stakeholder individuals, (v) meetings specifically with non-traditional groups,(vi) meetings specifically with non-traditional individuals and (vii) meetings with invited selected individuals from the general public.

V(A). Planned Program (Summary)

Program # 2

1. Name of the Planned Program

Global Food Security - Animals and Their Systems, Production and Health

2. Brief summary about Planned Program

In order to maintain and improve the efficiency and productivity of North Carolina and the nation's animal agriculture farmers and producers, a broad and effective plan of work has been developed. This work includes research and outreach through Cooperative Extension that includes NCA&T and NC State Universities, and engages many clientele groups including producers, agribusiness personnel and the general public. The plan of work addresses all the animal commodity groups important to North Carolina and will use any discipline necessary to address the issues of concern. New technology and knowledge will be disseminated to clientele groups both directly and indirectly through numerous methods. All participants and plans of work will be evaluated at least yearly to measure progress and success.

3. Program existence :

- ○ New (One year or less)
- ○ Intermediate (One to five years)
- ◉ Mature (More than five years)

4. Program duration :

- ○ Short-Term(One year or less)
- ○ Medium-Term (One to five years)
- ◉ Long-Term (More than five years)

5. Expending formula funds or state-matching funds :

- ◉ Yes
- ○ No

6. Expending other than formula funds or state-matching funds :

- ◉ Yes
- ○ No

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
301	Reproductive Performance of Animals	15%	20%	20%	30%
302	Nutrient Utilization in Animals	15%	20%	20%	20%
303	Genetic Improvement of Animals	15%	17%	17%	20%
307	Animal Management Systems	15%	18%	18%	0%
311	Animal Diseases	5%	10%	10%	20%
312	External Parasites and Pests of Animals	5%	5%	5%	0%
313	Internal Parasites in Animals	2%	5%	5%	0%
315	Animal Welfare/Well-Being and Protection	5%	2%	2%	7%
404	Instrumentation and Control Systems	5%	0%	0%	0%
511	New and Improved Non-Food Products and Processes	3%	0%	0%	0%
512	Quality Maintenance in Storing and Marketing Non-Food Products	5%	0%	0%	0%
601	Economics of Agricultural Production and Farm Management	4%	1%	1%	1%
602	Business Management, Finance, and Taxation	3%	1%	1%	1%
604	Marketing and Distribution Practices	3%	1%	1%	1%
	Total	100%	100%	100%	100%

V(C). Planned Program (Situation and Scope)

1. Situation and priorities

In today's world market, North Carolina farmers and animal producers must utilize cutting edge technology to remain the most efficient producers of wholesome and healthy food while maintaining or improving animal health and well being while also providing proper environmental stewardship for our land, water, and air resources. Over the next five years, this plan of work will involve a broad scope of players and participants including, but not necessarily limited to, NCSU and NCA&T faculty and staff, North Carolina Cooperative Extension Service personnel, farmers, agribusiness personnel, local and federal agency personnel, elected officials and the general public. Improving the efficiency of animal production will include improving reproductive performance, improvement in nutrient utilization, genetic improvement in growth and reproduction, improvements in animal management systems, decreases in incidence of animal diseases and parasites and improved management of animal and agricultural pests.

While many of these improvements will be accomplished in the research setting, ultimate success will be realized when these practices are adopted by farmers and agribusiness personnel through outreach efforts. Sharing of accomplishments with all stakeholders will ensure a smooth and successful transition of

new information from researchers to applied and working technology for the farmers accompanied by trust from the general public.

2. Scope of the Program

- ☑ In-State Extension
- ☑ In-State Research
- ☑ Multistate Research
- ☑ Multistate Extension
- ☑ Integrated Research and Extension
- ☑ Multistate Integrated Research and Extension

V(D). Planned Program (Assumptions and Goals)

1. Assumptions made for the Program

Basic assumptions to accomplish this plan of work include current level of personnel and support, appropriate funding to accomplish research and outreach programs, success in accomplishing the basic or applied research; i.e. taking advantage of opportunities and finding solutions to problems, appropriate outreach programs to deliver information to stakeholders, acceptance and usage by stakeholders of the new technology or information, acceptance and trust of general public of new programs adopted by clientele.

2. Ultimate goal(s) of this Program

The ultimate goal of this plan of work is to continue the progress of making our animal systems sustainable in at least three ways; sustainable in productivity and efficiency for both the producer and the consumer, sustainable with respect to our natural resources, and sustainable in the continued acceptance and trust of agriculture by the general public..

V(E). Planned Program (Inputs)

1. Estimated Number of professional FTE/SYs to be budgeted for this Program

Year	Extension		Research	
	1862	1890	1862	1890
2012	60.0	3.0	105.0	8.0
2013	60.0	3.0	105.0	8.0
2014	60.0	3.0	105.0	8.0
2015	60.0	3.0	105.0	8.0
2016	60.0	3.0	105.0	8.0

V(F). Planned Program (Activity)

1. Activity for the Program

This plan of work includes broad and extensive research and extension programs. NC Agricultural Research Service scientists will conduct research projects to study methods to improve the efficiency of

animal production. Research will focus on methods to improve reproductive performance, nutrient utilization, and genetic influence on growth and reproduction. Scientists will also work to improve animal management systems, decrease the incidence of animal diseases and parasites (external and internal) and improve the management of animal and agricultural pests. Species and commodity groups included in this plan of work are also very broad and include poultry such as turkeys, broiler chickens, and table-egg chickens. The plan of work also includes swine, fish such as flounder, and cattle such as beef and dairy, and numerous pests such as house flies. Research will include many phases of commodity production such as meat and dairy goats, chicken breeders (both broiler and table egg birds), commercial broilers (commercial refers to those animals produced for meat), breeder turkeys, commercial turkeys, swine breeders, commercial swine, all phases of aquaculture and beef and dairy production. Disciplines that will be involved include nutrition, physiology, reproductive physiology, genetics, virology, bacteriology, microbiology, mycology, entomology, and many animal management systems such as grazing and forage management programs, hatchery management, feeding and drinking water systems, litter and bedding management, lighting programs, and breeder selection and management. A very important part of this plan of work is to transfer technology and knowledge to our stake-holders and clientele. Therefore, an extensive outreach effort through Cooperative Extension will be conducted by field and campus based faculty who are based on-site as well as being located across the state and based in local communities. Stake-holders and clientele will be directly engaged in many ways including workshops, conferences, discussion groups, one-on-one teaching, demonstrations, field days, short-courses, continuing education classes, and scientific meetings. Indirect methods to reach stake-holders and clientele will include long-distance education, newsletters, web sites, newspaper releases, television and radio programs, trade journals, scientific journals, and popular press articles. Participants and programs will be evaluated at least annually for success, progress, and effectiveness. Special educational programs focused on limited resource farmers will continue to be a priority for NC A&T focused Extension efforts in pasture based production systems, aquaculture and alternative breeds.

2. Type(s) of methods to be used to reach direct and indirect contacts

Extension

Direct Methods	Indirect Methods
☑ Education Class	☐ Public Service Announcement
☑ Workshop	☐ Billboards
☐ Group Discussion	☑ Newsletters
☑ One-on-One Intervention	☑ TV Media Programs
☑ Demonstrations	☑ Web sites
☑ Other 1 (Scientific meetings)	☑ Other 1 (Conferences)
☑ Other 2 (Shows)	☑ Other 2 (Journals)

3. Description of targeted audience

The target audience will be primarily aquaculture, poultry, livestock producers, small-scale limited resource, beginningand underserved growers and agribusiness personnel in North Carolina. However, since North Carolina producers are some of the best in the world, ultimately, producers and agribusiness personnel across the country and around the world will be the primary audience. In addition, the audience will include personnel in other state and federal agencies, local, state and federal politicians, and other stakeholders including the general public.

V(G). Planned Program (Outputs)

1. Standard output measures

Target for the number of persons(contacts) to be reached through direct and indirect contact

	Direct Contact Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Year	Target	Target	Target	Target
2012	166200	350000	47750	50500
2013	166200	350000	47750	50500
2014	166200	350000	47750	50500
2015	164200	345000	48300	51000
2016	1200	100000	300	0

2. (Standard Research Target) Number of Patent Applications Submitted

2012:4 **2013:**4 **2014:**4 **2015:**5 **2016:**1

3. Expected Peer Review Publications

Year	Research Target	Extension Target	Total
2012	159	59	218
2013	160	60	220
2014	160	60	220
2015	167	60	227
2016	15	0	0

V(H). State Defined Outputs

1. Output Target

- Highly focused non-degree credit group training activities to be conducted

2012:700 **2013:**700 **2014:**700 **2015:**700 **2016:**700

- Relevant and impacts focused research projects to be conducted

2012:62 **2013:**62 **2014:**62 **2015:**65 **2016:**65

- Local, Area, Regional, and State Conferences to be Conducted

2012:40 **2013:**40 **2014:**40 **2015:**38 **2016:**38

- Local, Area, Regional, and State Educational Tours to be Conducted

2012:14 **2013:**14 **2014:**15 **2015:**13 **2016:**13

V(I). State Defined Outcome

O. No	Outcome Name
1	Additional income gained by animal producers improved planning, marketing, and financial practices
2	Net income increased by producers improving animal husbandry practices
3	Number of animal producers adopting improved animal husbandry practices
4	Number Livestock Producers Adopting and Applying Improved Planning and Financial Management Practices
5	Number of new technologies developed to prevent/treat animal diseases
6	New organic, farmers and agritourism markets established by individual entrepreneurs
7	Growers Adopting Improved Business Management Practices

Outcome # 1

1. Outcome Target

Additional income gained by animal producers improved planning, marketing, and financial practices

2. Outcome Type :

- (●) Change in Knowledge Outcome Measure
- ( ) Change in Action Outcome Measure
- ( ) Change in Condition Outcome Measure

2012:7700000 **2013:**7700000 **2014:**7700000 **2015:**7000000 **2016:**7000000

3. Associated Knowledge Area(s)

- ☑ 301 - Reproductive Performance of Animals
- ☑ 302 - Nutrient Utilization in Animals
- ☑ 303 - Genetic Improvement of Animals
- ☑ 307 - Animal Management Systems
- ☑ 311 - Animal Diseases
- ☑ 312 - External Parasites and Pests of Animals
- ☑ 313 - Internal Parasites in Animals
- ☑ 315 - Animal Welfare/Well-Being and Protection
- ☐ 404 - Instrumentation and Control Systems
- ☐ 511 - New and Improved Non-Food Products and Processes
- ☐ 512 - Quality Maintenance in Storing and Marketing Non-Food Products
- ☐ 601 - Economics of Agricultural Production and Farm Management
- ☐ 602 - Business Management, Finance, and Taxation
- ☐ 604 - Marketing and Distribution Practices

4. Associated Institute Type(s)

- ☑ 1862 Extension
- ☑ 1862 Research
- ☑ 1890 Extension
- ☑ 1890 Research

Outcome # 2

1. Outcome Target

Net income increased by producers improving animal husbandry practices

2. Outcome Type :

- ○ Change in Knowledge Outcome Measure
- ◉ Change in Action Outcome Measure
- ○ Change in Condition Outcome Measure

2012:8000000 **2013:**8000000 **2014:**8000000 **2015:**7500000 **2016:**7500000

3. Associated Knowledge Area(s)

- ☑ 301 - Reproductive Performance of Animals
- ☑ 302 - Nutrient Utilization in Animals
- ☑ 303 - Genetic Improvement of Animals
- ☑ 307 - Animal Management Systems
- ☑ 311 - Animal Diseases
- ☑ 312 - External Parasites and Pests of Animals
- ☑ 313 - Internal Parasites in Animals
- ☑ 315 - Animal Welfare/Well-Being and Protection
- ☐ 404 - Instrumentation and Control Systems
- ☐ 511 - New and Improved Non-Food Products and Processes
- ☐ 512 - Quality Maintenance in Storing and Marketing Non-Food Products
- ☐ 601 - Economics of Agricultural Production and Farm Management
- ☐ 602 - Business Management, Finance, and Taxation
- ☐ 604 - Marketing and Distribution Practices

4. Associated Institute Type(s)

- ☑ 1862 Extension
- ☑ 1862 Research
- ☑ 1890 Extension
- ☑ 1890 Research

Outcome # 3

1. Outcome Target

Number of animal producers adopting improved animal husbandry practices

2. Outcome Type :

- ○ Change in Knowledge Outcome Measure
- ◉ Change in Action Outcome Measure
- ○ Change in Condition Outcome Measure

2012:4000 **2013:**4000 **2014:**4000 **2015:**4100 **2016:**4100

3. Associated Knowledge Area(s)

- ☑ 301 - Reproductive Performance of Animals
- ☑ 302 - Nutrient Utilization in Animals
- ☑ 303 - Genetic Improvement of Animals
- ☑ 307 - Animal Management Systems
- ☑ 311 - Animal Diseases
- ☑ 312 - External Parasites and Pests of Animals
- ☑ 313 - Internal Parasites in Animals
- ☑ 315 - Animal Welfare/Well-Being and Protection
- ☐ 404 - Instrumentation and Control Systems
- ☐ 511 - New and Improved Non-Food Products and Processes
- ☐ 512 - Quality Maintenance in Storing and Marketing Non-Food Products
- ☐ 601 - Economics of Agricultural Production and Farm Management
- ☐ 602 - Business Management, Finance, and Taxation
- ☐ 604 - Marketing and Distribution Practices

4. Associated Institute Type(s)

- ☑ 1862 Extension
- ☑ 1862 Research
- ☑ 1890 Extension
- ☑ 1890 Research

Outcome # 4

1. Outcome Target

Number Livestock Producers Adopting and Applying Improved Planning and Financial Management Practices

2. Outcome Type :

- ○ Change in Knowledge Outcome Measure
- ◉ Change in Action Outcome Measure
- ○ Change in Condition Outcome Measure

2012:3000 **2013:**3000 **2014:**3000 **2015:**2800 **2016:**2800

3. Associated Knowledge Area(s)

- ☑ 301 - Reproductive Performance of Animals
- ☑ 302 - Nutrient Utilization in Animals
- ☑ 303 - Genetic Improvement of Animals
- ☑ 307 - Animal Management Systems
- ☑ 311 - Animal Diseases
- ☑ 312 - External Parasites and Pests of Animals
- ☐ 313 - Internal Parasites in Animals
- ☑ 315 - Animal Welfare/Well-Being and Protection
- ☐ 404 - Instrumentation and Control Systems
- ☐ 511 - New and Improved Non-Food Products and Processes
- ☐ 512 - Quality Maintenance in Storing and Marketing Non-Food Products
- ☐ 601 - Economics of Agricultural Production and Farm Management
- ☐ 602 - Business Management, Finance, and Taxation
- ☐ 604 - Marketing and Distribution Practices

4. Associated Institute Type(s)

- ☑ 1862 Extension
- ☑ 1862 Research
- ☑ 1890 Extension
- ☐ 1890 Research

Outcome # 5

1. Outcome Target

Number of new technologies developed to prevent/treat animal diseases

2. Outcome Type :

- (●) Change in Knowledge Outcome Measure
- ( ) Change in Action Outcome Measure
- ( ) Change in Condition Outcome Measure

2012:2 **2013:**2 **2014:**2 **2015:**3 **2016:**3

3. Associated Knowledge Area(s)

- ☑ 301 - Reproductive Performance of Animals
- ☑ 302 - Nutrient Utilization in Animals
- ☑ 303 - Genetic Improvement of Animals
- ☐ 307 - Animal Management Systems
- ☑ 311 - Animal Diseases
- ☐ 312 - External Parasites and Pests of Animals
- ☐ 313 - Internal Parasites in Animals
- ☑ 315 - Animal Welfare/Well-Being and Protection
- ☐ 404 - Instrumentation and Control Systems
- ☐ 511 - New and Improved Non-Food Products and Processes
- ☐ 512 - Quality Maintenance in Storing and Marketing Non-Food Products
- ☐ 601 - Economics of Agricultural Production and Farm Management
- ☐ 602 - Business Management, Finance, and Taxation
- ☐ 604 - Marketing and Distribution Practices

4. Associated Institute Type(s)

- ☐ 1862 Extension
- ☑ 1862 Research
- ☐ 1890 Extension
- ☑ 1890 Research

Outcome # 6

1. Outcome Target

New organic, farmers and agritourism markets established by individual entrepreneurs

2. Outcome Type :

- ○ Change in Knowledge Outcome Measure
- ◉ Change in Action Outcome Measure
- ○ Change in Condition Outcome Measure

2012:250 **2013:**250 **2014:**250 **2015:**250 **2016:**250

3. Associated Knowledge Area(s)

- ☐ 301 - Reproductive Performance of Animals
- ☐ 302 - Nutrient Utilization in Animals
- ☐ 303 - Genetic Improvement of Animals
- ☐ 307 - Animal Management Systems
- ☐ 311 - Animal Diseases
- ☐ 312 - External Parasites and Pests of Animals
- ☐ 313 - Internal Parasites in Animals
- ☐ 315 - Animal Welfare/Well-Being and Protection
- ☐ 404 - Instrumentation and Control Systems
- ☑ 511 - New and Improved Non-Food Products and Processes
- ☐ 512 - Quality Maintenance in Storing and Marketing Non-Food Products
- ☑ 601 - Economics of Agricultural Production and Farm Management
- ☑ 602 - Business Management, Finance, and Taxation
- ☑ 604 - Marketing and Distribution Practices

4. Associated Institute Type(s)

- ☑ 1862 Extension
- ☐ 1862 Research
- ☑ 1890 Extension
- ☐ 1890 Research

Outcome # 7

1. Outcome Target

Growers Adopting Improved Business Management Practices

2. Outcome Type :

- ○ Change in Knowledge Outcome Measure
- ◉ Change in Action Outcome Measure
- ○ Change in Condition Outcome Measure

2012:500 **2013:**500 **2014:**500 **2015:**500 **2016:**500

3. Associated Knowledge Area(s)

- ☐ 301 - Reproductive Performance of Animals
- ☐ 302 - Nutrient Utilization in Animals
- ☐ 303 - Genetic Improvement of Animals
- ☐ 307 - Animal Management Systems
- ☐ 311 - Animal Diseases
- ☐ 312 - External Parasites and Pests of Animals
- ☐ 313 - Internal Parasites in Animals
- ☐ 315 - Animal Welfare/Well-Being and Protection
- ☐ 404 - Instrumentation and Control Systems
- ☐ 511 - New and Improved Non-Food Products and Processes
- ☐ 512 - Quality Maintenance in Storing and Marketing Non-Food Products
- ☑ 601 - Economics of Agricultural Production and Farm Management
- ☑ 602 - Business Management, Finance, and Taxation
- ☑ 604 - Marketing and Distribution Practices

4. Associated Institute Type(s)

- ☑ 1862 Extension
- ☐ 1862 Research
- ☑ 1890 Extension
- ☐ 1890 Research

V(J). Planned Program (External Factors)

1. External Factors which may affect Outcomes

- ☑ Natural Disasters (drought, weather extremes, etc.)
- ☑ Economy
- ☑ Appropriations changes
- ☑ Public Policy changes
- ☑ Government Regulations

- ☑ Competing Public priorities
- ☑ Competing Programmatic Challenges
- ☑ Populations changes (immigration, new cultural groupings, etc.)
- ☐ Other

Description

Anything that competes for public funding or that affects public policy can have an impact on this plan of work. There is a very great risk that most of the participants in this plan of work will have their funding, activities, or both re-directed if significant external factors occur. External factors such as appropriation changes or policy changes can affect funding available to support programs while factors such as public priorities and population changes can affect specific program activities. Severe external factors such as hurricanes can affect both funding and program activities for an extended period of time.

V(K). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

- ☑ After Only (post program)
- ☑ Retrospective (post program)
- ☑ Before-After (before and after program)
- ☑ During (during program)
- ☐ Time series (multiple points before and after program)
- ☐ Case Study
- ☑ Comparisons between program participants (individuals, group, organizations) and non-participants
- ☑ Comparisons between different groups of individuals or program participants experiencing different levels of program intensity.
- ☐ Comparison between locales where the program operates and sites without program intervention
- ☐ Other

Description

All participants and programs will be evaluated at least yearly to measure progress and success. Stakeholders and clientele will be surveyed periodically to determine continued importance of current programs and to ascertain the need for new or modified programs.

2. Data Collection Methods

- ☑ Sampling
- ☑ Whole population

Survey (Mail, Telephone, On-Site).

- ☑ Mail
- ☑ Telephone
- ☑ On-Site

Interview

- ☑ Structured

- ☑ Unstructured
- ☐ Case Study
- ☑ Observation
- ☐ Portfolio Reviews
- ☑ Tests
- ☐ Journals
- ☐ Other

Description

Various methods of evaluation will be used depending on the specific project. Clientele and stakeholders will be surveyed individually or in group settings. Stakeholder input will be collected during meetings such as workshops and conferences.

V(A). Planned Program (Summary)

Program # 3

1. Name of the Planned Program

Climate Change

2. Brief summary about Planned Program

This program generates and provides knowledge to develop and maintain highly productive agricultural and ecological systems in the context of climate changes. Strategies will help producers and managers plan for and make decisions to adapt to changing environments and sustain economic vitality, and take advantage of emerging economic opportunities offered by climate change mitigation technologies. Research and extension education will examine and provide solutions in the areas of soil, plant, water and nutrient relationships; management, conservation and efficient use of water; watershed protection and management; pollution prevention and mitigation; air quality; natural resource and environmental economics; waste disposal (including animal waste resulting from the production of hogs, poultry and other animals for the food supply) and recycling; controlling greenhouse gas production and carbon footprints of agricultural and related systems. A primary audience for this program is the small-scale and limited resource farmers in the state.

3. Program existence :

- ○ New (One year or less)
- ◉ Intermediate (One to five years)
- ○ Mature (More than five years)

4. Program duration :

- ○ Short-Term(One year or less)
- ○ Medium-Term (One to five years)
- ◉ Long-Term (More than five years)

5. Expending formula funds or state-matching funds :

- ◉ Yes
- ○ No

6. Expending other than formula funds or state-matching funds :

- ◉ Yes
- ○ No

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
102	Soil, Plant, Water, Nutrient Relationships	20%	20%	20%	20%
111	Conservation and Efficient Use of Water	5%	5%	5%	5%
112	Watershed Protection and Management	10%	10%	10%	10%
133	Pollution Prevention and Mitigation	10%	10%	10%	10%
141	Air Resource Protection and Management	5%	5%	5%	5%
401	Structures, Facilities, and General Purpose Farm Supplies	5%	5%	5%	5%
402	Engineering Systems and Equipment	5%	5%	5%	5%
403	Waste Disposal, Recycling, and Reuse	10%	10%	10%	10%
404	Instrumentation and Control Systems	5%	5%	5%	5%
405	Drainage and Irrigation Systems and Facilities	5%	5%	5%	5%
605	Natural Resource and Environmental Economics	20%	20%	20%	20%
	Total	100%	100%	100%	100%

V(C). Planned Program (Situation and Scope)

1. Situation and priorities

North Carolina is a state of diverse and remarkable physical and natural resources. A strong agriculture is critical to the economy of the state. At the same time, the preservation of the environment and the health of our citizens is of paramount concern. Thus research and outreach efforts that address these goals will have high priority. The research and extension programs at NC A&T SU assumes responsibility for developing and providing watershed sustainability, waste management and pollution prevention programs for small and limited resource farmers and urban and limited resource audiences.

North Carolina is one of the fastest growing states in the country. Rapid growth needs to be supported by sound environmental decisions that preserve and enhance the soil and water quality of the region. The university faculty will implement research projects to investigate best management practices that improve soil and water quality and mitigate environmental degradation resulting from urban and suburban development.

Past soil management practices, designed to meet the food and fiber needs of an increasing population, have taxed the resiliency of natural processes to maintain global balances of energy and matter. The degradation of our soil resources is motivating researchers and farmers toinvestigate and employ less input-intensive and more sustainable management systems that protect the environment and soil resources.

Researchers will also investigate water pollutants from residential, commercial and institutional establishments. Best management practices in the urban environment to maintain high quality water in North Carolina watersheds include: sensible subdivision practices such as management of impervious surfaces, reduction in fertilizer and pesticide applications to the urban and suburban landscape (private

properties of all sizes), proper maintenance of wastewater collection and treatment systems, and water conservation. The research will address soil and water quality issues in North Carolina. Specific focus areas include:

- Agricultural Best Management Practices
- Non-Agricultural Best Management Practices

NCSU's Center for Environmental and Resource Economic Policy focuses on economic research and outreach that address many of today's important natural resource and environmental management problems, including economic aspects of land use planning, economics of nutrient management and nutrient reduction benefits related to environmental policies. Protection of the state's natural resources also requires innovative research and aggressive educational and demonstration programs to prevent pollution on farm, watershed and community scales, and use of BMPs as effective strategies maintain and enhance water quality and natural habitats.

2. Scope of the Program

- ☑ In-State Extension
- ☑ In-State Research
- ☑ Multistate Research
- ☑ Multistate Extension
- ☑ Integrated Research and Extension
- ☑ Multistate Integrated Research and Extension

V(D). Planned Program (Assumptions and Goals)

1. Assumptions made for the Program

Funding will be available from state, federal and grant sources for the high priority programs, expanding those areas that have the greatest potential for most impact on the environment and natural resources. Program activities will continue to engage a wide array of stakeholders, including minority and culturally diverse audiences in decision-making and land use policy communications to overcome environmental problems.

2. Ultimate goal(s) of this Program

To improve agricultural and forest land, watershed and ecosystem productivity, while maintaining environmental quality and natural resource utilization. To ensure that diverse audiences, including minority and limited resource audiences participate in decisions-making and land use policy communications to address environmental problems and concerns.

V(E). Planned Program (Inputs)

1. Estimated Number of professional FTE/SYs to be budgeted for this Program

Year	Extension		Research	
	1862	1890	1862	1890
2012	55.0	4.0	25.0	6.0
2013	55.0	4.0	25.0	6.0
2014	55.0	4.0	25.0	6.0

Year	Extension		Research	
	1862	1890	1862	1890
2015	55.0	4.0	25.0	6.0
2016	55.0	4.0	25.0	6.0

V(F). Planned Program (Activity)

1. Activity for the Program

Research will focus on creating new knowledge and solutions from basic research (e.g., nutshell-based activated carbons), to agricultural production systems research, to natural resource pollution prevention strategies, to examining people's attitudes and concerns about environmental issues and policies, including economic considerations. With this research information in hand, improved management, technological solutions and policies to environmental and natural resource utilization problems will be proposed and evaluated with farmers, businesses, stakeholders and communities. Technology transfer will occur through demonstrations, workshops, and various media from Cooperative Extension in concert with researchers.

2. Type(s) of methods to be used to reach direct and indirect contacts

Extension

Direct Methods	Indirect Methods
☑ Education Class	☑ Public Service Announcement
☑ Workshop	☐ Billboards
☑ Group Discussion	☑ Newsletters
☑ One-on-One Intervention	☑ TV Media Programs
☑ Demonstrations	☑ Web sites
☑ Other 1 (conferences)	☐ Other 1
☐ Other 2	☐ Other 2

3. Description of targeted audience

Agricultural producers, environmental and governmental agencies, news media, general public, limited resource audiences, rural appraisers, commodity associations

V(G). Planned Program (Outputs)

1. Standard output measures

Target for the number of persons(contacts) to be reached through direct and indirect contact

	Direct Contact Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Year	Target	Target	Target	Target
2012	80000	175000	15000	20000

	Direct Contact Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Year	Target	Target	Target	Target
2013	80000	175000	15000	20000
2014	80000	175000	15000	20000
2015	80000	175000	15000	20000
2016	80000	175000	15000	20000

2. (Standard Research Target) Number of Patent Applications Submitted

2012:2 **2013:**2 **2014:**2 **2015:**2 **2016:**2

3. Expected Peer Review Publications

Year	Research Target	Extension Target	Total
2012	50	18	68
2013	50	18	68
2014	50	18	68
2015	50	18	68
2016	50	18	68

V(H). State Defined Outputs

1. Output Target

- Waste Management Certification Programs

  2012:40 **2013:**40 **2014:**40 **2015:**40 **2016:**40

- Number research project completed on environmental/natural resource issues

  2012:12 **2013:**12 **2014:**12 **2015:**12 **2016:**12

- Number of non-degree credit environmental activities conducted

  2012:750 **2013:**750 **2014:**750 **2015:**750 **2016:**750

- Enrollees for Natural Resources Leadership Institutes training

  2012:16 **2013:**16 **2014:**16 **2015:**16 **2016:**16

V(I). State Defined Outcome

O. No	Outcome Name
1	Number of farms utilizing precision application technologies
2	Number farms implementing best management practices for animal waste management
3	Number urban households/small farms with low-literacy individuals implementing or adopting best management practices to enhance water quality
4	Number waste management certifications gained or maintained
5	Number acres where proper waste analysis was used for proper land application
6	Number growers implementing stream protection practices
7	Number storm water systems installing BMPs
8	Number farms adopting use of biofuels
9	Number growers implementing improved irrigation and drainage systems

Outcome # 1

1. Outcome Target

Number of farms utilizing precision application technologies

2. Outcome Type :

- ○ Change in Knowledge Outcome Measure
- ◉ Change in Action Outcome Measure
- ○ Change in Condition Outcome Measure

2012:650 **2013:**650 **2014:**650 **2015:**650 **2016:**650

3. Associated Knowledge Area(s)

- ☐ 102 - Soil, Plant, Water, Nutrient Relationships
- ☑ 111 - Conservation and Efficient Use of Water
- ☑ 112 - Watershed Protection and Management
- ☑ 133 - Pollution Prevention and Mitigation
- ☐ 141 - Air Resource Protection and Management
- ☐ 401 - Structures, Facilities, and General Purpose Farm Supplies
- ☐ 402 - Engineering Systems and Equipment
- ☐ 403 - Waste Disposal, Recycling, and Reuse
- ☐ 404 - Instrumentation and Control Systems
- ☐ 405 - Drainage and Irrigation Systems and Facilities
- ☐ 605 - Natural Resource and Environmental Economics

4. Associated Institute Type(s)

- ☑ 1862 Extension
- ☑ 1862 Research
- ☑ 1890 Extension
- ☑ 1890 Research

Outcome # 2

1. Outcome Target

Number farms implementing best management practices for animal waste management

2. Outcome Type :

- ○ Change in Knowledge Outcome Measure
- ◉ Change in Action Outcome Measure
- ○ Change in Condition Outcome Measure

2012:1500 **2013:**1500 **2014:**1500 **2015:**1500 **2016:**1500

3. Associated Knowledge Area(s)

- ☑ 102 - Soil, Plant, Water, Nutrient Relationships
- ☑ 111 - Conservation and Efficient Use of Water
- ☑ 112 - Watershed Protection and Management
- ☑ 133 - Pollution Prevention and Mitigation
- ☑ 141 - Air Resource Protection and Management
- ☐ 401 - Structures, Facilities, and General Purpose Farm Supplies
- ☐ 402 - Engineering Systems and Equipment
- ☐ 403 - Waste Disposal, Recycling, and Reuse
- ☐ 404 - Instrumentation and Control Systems
- ☐ 405 - Drainage and Irrigation Systems and Facilities
- ☐ 605 - Natural Resource and Environmental Economics

4. Associated Institute Type(s)

- ☑ 1862 Extension
- ☑ 1862 Research
- ☑ 1890 Extension
- ☑ 1890 Research

Outcome # 3

1. Outcome Target

Number urban households/small farms with low-literacy individuals implementing or adopting best management practices to enhance water quality

2. Outcome Type :

- ○ Change in Knowledge Outcome Measure
- ◉ Change in Action Outcome Measure
- ○ Change in Condition Outcome Measure

2012:55 **2013:**55 **2014:**55 **2015:**55 **2016:**55

3. Associated Knowledge Area(s)

- ☐ 102 - Soil, Plant, Water, Nutrient Relationships
- ☑ 111 - Conservation and Efficient Use of Water
- ☑ 112 - Watershed Protection and Management
- ☑ 133 - Pollution Prevention and Mitigation
- ☐ 141 - Air Resource Protection and Management
- ☐ 401 - Structures, Facilities, and General Purpose Farm Supplies
- ☐ 402 - Engineering Systems and Equipment
- ☐ 403 - Waste Disposal, Recycling, and Reuse
- ☐ 404 - Instrumentation and Control Systems
- ☐ 405 - Drainage and Irrigation Systems and Facilities
- ☐ 605 - Natural Resource and Environmental Economics

4. Associated Institute Type(s)

- ☑ 1862 Extension
- ☑ 1862 Research
- ☑ 1890 Extension
- ☑ 1890 Research

Outcome # 4

1. Outcome Target

Number waste management certifications gained or maintained

2. Outcome Type :

- ◉ Change in Knowledge Outcome Measure
- ◯ Change in Action Outcome Measure
- ◯ Change in Condition Outcome Measure

2012:3000 **2013:**3000 **2014:**3000 **2015:**3000 **2016:**3000

3. Associated Knowledge Area(s)

- ☑ 102 - Soil, Plant, Water, Nutrient Relationships
- ☑ 111 - Conservation and Efficient Use of Water
- ☑ 112 - Watershed Protection and Management
- ☑ 133 - Pollution Prevention and Mitigation
- ☑ 141 - Air Resource Protection and Management
- ☐ 401 - Structures, Facilities, and General Purpose Farm Supplies
- ☐ 402 - Engineering Systems and Equipment
- ☐ 403 - Waste Disposal, Recycling, and Reuse
- ☐ 404 - Instrumentation and Control Systems

- ☐ 405 - Drainage and Irrigation Systems and Facilities
- ☐ 605 - Natural Resource and Environmental Economics

4. Associated Institute Type(s)

- ☑ 1862 Extension
- ☑ 1862 Research
- ☑ 1890 Extension
- ☑ 1890 Research

Outcome # 5

1. Outcome Target

Number acres where proper waste analysis was used for proper land application

2. Outcome Type :

- ○ Change in Knowledge Outcome Measure
- ◉ Change in Action Outcome Measure
- ○ Change in Condition Outcome Measure

2012:800000 **2013:**800000 **2014:**800000 **2015:**800000 **2016:**800000

3. Associated Knowledge Area(s)

- ☑ 102 - Soil, Plant, Water, Nutrient Relationships
- ☑ 111 - Conservation and Efficient Use of Water
- ☑ 112 - Watershed Protection and Management
- ☑ 133 - Pollution Prevention and Mitigation
- ☐ 141 - Air Resource Protection and Management
- ☐ 401 - Structures, Facilities, and General Purpose Farm Supplies
- ☐ 402 - Engineering Systems and Equipment
- ☐ 403 - Waste Disposal, Recycling, and Reuse
- ☐ 404 - Instrumentation and Control Systems
- ☐ 405 - Drainage and Irrigation Systems and Facilities
- ☐ 605 - Natural Resource and Environmental Economics

4. Associated Institute Type(s)

- ☑ 1862 Extension
- ☑ 1862 Research
- ☑ 1890 Extension
- ☑ 1890 Research

Outcome # 6

1. Outcome Target

Number growers implementing stream protection practices

2. Outcome Type :

- ○ Change in Knowledge Outcome Measure
- ◉ Change in Action Outcome Measure
- ○ Change in Condition Outcome Measure

2012:300 **2013:**300 **2014:**300 **2015:**300 **2016:**300

3. Associated Knowledge Area(s)

- ☐ 102 - Soil, Plant, Water, Nutrient Relationships
- ☐ 111 - Conservation and Efficient Use of Water
- ☐ 112 - Watershed Protection and Management
- ☑ 133 - Pollution Prevention and Mitigation
- ☐ 141 - Air Resource Protection and Management
- ☐ 401 - Structures, Facilities, and General Purpose Farm Supplies
- ☑ 402 - Engineering Systems and Equipment
- ☑ 403 - Waste Disposal, Recycling, and Reuse
- ☑ 404 - Instrumentation and Control Systems
- ☑ 405 - Drainage and Irrigation Systems and Facilities
- ☐ 605 - Natural Resource and Environmental Economics

4. Associated Institute Type(s)

- ☑ 1862 Extension
- ☑ 1862 Research
- ☑ 1890 Extension
- ☐ 1890 Research

Outcome # 7

1. Outcome Target

Number storm water systems installing BMPs

2. Outcome Type :

- ○ Change in Knowledge Outcome Measure
- ◉ Change in Action Outcome Measure
- ○ Change in Condition Outcome Measure

2012:40 **2013:**40 **2014:**40 **2015:**40 **2016:**40

3. Associated Knowledge Area(s)

- ☐ 102 - Soil, Plant, Water, Nutrient Relationships
- ☐ 111 - Conservation and Efficient Use of Water
- ☐ 112 - Watershed Protection and Management
- ☑ 133 - Pollution Prevention and Mitigation
- ☐ 141 - Air Resource Protection and Management
- ☐ 401 - Structures, Facilities, and General Purpose Farm Supplies
- ☑ 402 - Engineering Systems and Equipment
- ☑ 403 - Waste Disposal, Recycling, and Reuse
- ☑ 404 - Instrumentation and Control Systems
- ☑ 405 - Drainage and Irrigation Systems and Facilities
- ☐ 605 - Natural Resource and Environmental Economics

4. Associated Institute Type(s)

- ☑ 1862 Extension
- ☑ 1862 Research
- ☑ 1890 Extension
- ☑ 1890 Research

Outcome # 8

1. Outcome Target

Number farms adopting use of biofuels

2. Outcome Type :

- ○ Change in Knowledge Outcome Measure
- ◉ Change in Action Outcome Measure
- ○ Change in Condition Outcome Measure

2012:25 **2013:**25 **2014:**25 **2015:**25 **2016:**25

3. Associated Knowledge Area(s)

- ☐ 102 - Soil, Plant, Water, Nutrient Relationships
- ☐ 111 - Conservation and Efficient Use of Water
- ☐ 112 - Watershed Protection and Management
- ☐ 133 - Pollution Prevention and Mitigation
- ☐ 141 - Air Resource Protection and Management
- ☑ 401 - Structures, Facilities, and General Purpose Farm Supplies
- ☐ 402 - Engineering Systems and Equipment
- ☐ 403 - Waste Disposal, Recycling, and Reuse
- ☐ 404 - Instrumentation and Control Systems
- ☐ 405 - Drainage and Irrigation Systems and Facilities
- ☐ 605 - Natural Resource and Environmental Economics

4. Associated Institute Type(s)

- ☑ 1862 Extension
- ☑ 1862 Research
- ☑ 1890 Extension
- ☑ 1890 Research

Outcome # 9

1. Outcome Target

Number growers implementing improved irrigation and drainage systems

2. Outcome Type :

- ○ Change in Knowledge Outcome Measure
- ◉ Change in Action Outcome Measure
- ○ Change in Condition Outcome Measure

2012:30	**2013:**30	**2014:**30	**2015:**30	**2016:**30

3. Associated Knowledge Area(s)

- ☐ 102 - Soil, Plant, Water, Nutrient Relationships
- ☐ 111 - Conservation and Efficient Use of Water
- ☐ 112 - Watershed Protection and Management
- ☑ 133 - Pollution Prevention and Mitigation
- ☐ 141 - Air Resource Protection and Management
- ☐ 401 - Structures, Facilities, and General Purpose Farm Supplies
- ☑ 402 - Engineering Systems and Equipment
- ☑ 403 - Waste Disposal, Recycling, and Reuse
- ☑ 404 - Instrumentation and Control Systems

- ☑ 405 - Drainage and Irrigation Systems and Facilities
- ☐ 605 - Natural Resource and Environmental Economics

4. Associated Institute Type(s)

- ☑ 1862 Extension
- ☑ 1862 Research
- ☑ 1890 Extension
- ☐ 1890 Research

V(J). Planned Program (External Factors)

1. External Factors which may affect Outcomes

- ☑ Natural Disasters (drought, weather extremes, etc.)
- ☑ Economy
- ☑ Appropriations changes
- ☑ Public Policy changes
- ☑ Government Regulations
- ☑ Competing Public priorities
- ☑ Competing Programmatic Challenges
- ☐ Populations changes (immigration, new cultural groupings, etc.)
- ☐ Other

Description

Weather-related issues can and will have a major impact on environmental research and outreach programs. The economy and any changes in program funding can have significant impact not only on the research and extension efforts, but also on adoption of BMPs and other technologies that can impact agricultural operations and related environments on the farm, in watershed, and communities. Public policy and regulations will dictate, to a large degree, the topics that are of most concern or interest to the agricultural community as will as local communities. Funding reductions create significant impediments in a number of these research/outreach areas, many of which require significant human resources and expensive data collection approaches.

V(K). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

- ☑ After Only (post program)
- ☐ Retrospective (post program)
- ☑ Before-After (before and after program)
- ☑ During (during program)

- ☑ Time series (multiple points before and after program)
- ☐ Case Study
- ☑ Comparisons between program participants (individuals, group, organizations) and non-participants
- ☐ Comparisons between different groups of individuals or program participants experiencing different levels of program intensity.
- ☐ Comparison between locales where the program operates and sites without program intervention
- ☐ Other

Description

Some studies will attempt to quantify the "before study" baseline and then determine the change caused by the implementation of specific practices, structures, etc. Other studies will attempt to quantify the rate of change during the program. In some cases, participants will be compared with non-participants (to the extent possible).

2. Data Collection Methods

- ☑ Sampling
- ☑ Whole population

Survey (Mail, Telephone, On-Site).

- ☐ Mail
- ☐ Telephone
- ☑ On-Site

Interview

- ☐ Structured
- ☐ Unstructured

- ☐ Case Study
- ☑ Observation
- ☐ Portfolio Reviews
- ☐ Tests
- ☐ Journals
- ☐ Other

Description

Methods of data collection will vary among the various research projects and extension activities. Publications of new technologies, patents and faculty impact statements will describe research productivity. Applied, demonstrational research and extension programs will provide opportunities for meetings, conversations and surveys with traditional and non-traditional stakeholder groups and individuals, funders, and users, including minority and underserved audiences.

V(A). Planned Program (Summary)

Program # 4

1. Name of the Planned Program

Sustainable Energy including Biotechnology

2. Brief summary about Planned Program

Research and Extension programs in North Carolina are positioned to contribute significantly through research to the development of new agricultural and forestry based energy sources and to the creation of new energy use strategies to reduce consumption in structures, commercial agribusinesses and in industries, creating cost savings and improving energy conservation and efficiency. Research, engineering, economic evaluation and outreach at North Carolina's two land grant universities, along with the Biofuels Center of North Carolina, are committed to creating new knowledge and delivering science based information to the public, connecting farmers, dwelling owners, business owners and leaders across the state with information to enhance energy sustainability in the state. Scientists are developing ways to convert biomass into clean-burning alternative fuels and sharing their findings with users interested in the production and utilization of biofuels. Some approaches include: successful development and deployment **of hybrid thermal and microbial conversion technologies for biofuel production** from biomass. **Solid substrate cultivation (SSC)** and **liquid fermentations** are designed to produce low-cost cellulolytic, ligninolytic, and amylolytic enzymes, which can contribute to the processing of feedstocks for biologically-based products, including biofuels. The combined process of **biomass gasification and anaerobic bacterial fermentation** offers increased carbon conversion of lignocellulosic biomass, including lignin, and a biologically based production method for ethanol and other potential products, such as acetic acid, butanol and butyrate**. Sweet sorghum** may show promise as an alternative agricultural source of sugar for ethanol fermentation.**Clostridium thermocellum, a thermophilic, anaerobic and cellulolytic bacterium, simultaneously hydrolyzes cellulosic substrates to simple sugars, producing ethanol.** Considerable effort has been devoted to Scientists who have developed and refined a **torrification** process to turn waste wood material into various usable materials including as a fuel source. **Cattails are being evaluated to treat swine waste water and produce ethanol**. Research and extension programs also address household energy efficiency and conservation as well as engineering energy efficient solutions applicable to agricultural systems such as irrigation technology, animal housing systems, and heat curing of agricultural products. Programs address the adoption of specific behaviors, energy conservation strategies, and the installation/application of energy efficient technologies and retrofits aimed at reducing overall consumption and improving energy efficiency of existing structures. Many of the technologies and results of these integrated research and extension programs are useful and applicable to the needs of a wide array of large and small, part-time farmers, homeowners, agribusinesses, food processors and will benefit consumers. Scientists developing this information work in conjunction with field faculty and partners to provide these technologies to users in educational programs, field testing and demonstrations.

3. Program existence :

- (●) New (One year or less)
- ( ) Intermediate (One to five years)
- ( ) Mature (More than five years)

4. Program duration :

- ( ) Short-Term(One year or less)
- ( ) Medium-Term (One to five years)
- (●) Long-Term (More than five years)

5. Expending formula funds or state-matching funds :

- (●) Yes
- ( ) No

6. Expending other than formula funds or state-matching funds :

- (●) Yes
- ( ) No

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
202	Plant Genetic Resources	15%	10%	15%	20%
205	Plant Management Systems	15%	20%	20%	20%
401	Structures, Facilities, and General Purpose Farm Supplies	5%	10%	5%	0%
402	Engineering Systems and Equipment	20%	10%	20%	20%
403	Waste Disposal, Recycling, and Reuse	20%	20%	15%	20%
404	Instrumentation and Control Systems	10%	10%	10%	0%
511	New and Improved Non-Food Products and Processes	15%	20%	15%	20%
	Total	100%	100%	100%	100%

V(C). Planned Program (Situation and Scope)

1. Situation and priorities

North Carolina has a strong agricultural industry, a wealth of natural resources and is continually a desired location for businesses and families. As a result, supplies of energy sources that are economical, available and efficient are critical to the economy of the state. As needs and opportunities emerge, research scientists and extension educators at our land grant universities constantly adapt their programs to develop and communicate solutions to promote energy conservation, energy use efficiency and finding new sources of energy to reduce reliance on fossil fuels, an aim consistent with both state and federal

mandates. For households, on farms and in agricultural processing and manufacturing facilities, new technologies are sought to improve energy conservation and efficiency, to provide engineering solutions to reduce energy needs for drying and curing crops and raising animals, and to develop agronomic crop production and engineered systems to create biofuels from sugar producing and cellulosic crops that can be effectively produced by the states farmers. And in the context of these energy conserving, efficiency improving and energy generating approaches, the state's consumers, farmers, businesses and overall economy greatly benefit.

Exploiting these opportunities requires the involvement of a variety of scientists from different disciplines, including the traditional disciplines as well as genomics, advanced instrumentation and remote sensing, engineering approaches and economics to fully develop and deploy new technologies to achieve sustainable energy supplies into the future.

2. Scope of the Program

- ☑ In-State Extension
- ☑ In-State Research
- ☐ Multistate Research
- ☐ Multistate Extension
- ☑ Integrated Research and Extension
- ☐ Multistate Integrated Research and Extension

V(D). Planned Program (Assumptions and Goals)

1. Assumptions made for the Program

*continued funding from state and federal sources for sustainable energy research and extension

*the agricultural economy and system will be able to adapt to new opportunities to participate in the production of substrates for biofuels and benefit from energy conservation

2. Ultimate goal(s) of this Program

The primary goal of this program is to contribute to energy sufficiency and sustainability based on the production of biofuels and other alternative energy sources and effective conservation and use of available energy supplies by consumers, farmers and manufacturers and processors. To the extent possible, these systems developed will be adaptable to North Carolina's resource and in the practice of these systems, will benefit the state's agricultural and forestry community by providing increased agricultural and forestry production opportunities and benefit consumers, farmers and processors by providing competitively priced and available energy resources, and improved water and air quality.

V(E). Planned Program (Inputs)

1. Estimated Number of professional FTE/SYs to be budgeted for this Program

Year	Extension		Research	
	1862	1890	1862	1890
2012	7.0	2.0	10.0	5.0
2013	7.0	2.0	10.0	5.0

Year	Extension		Research	
	1862	1890	1862	1890
2014	7.0	2.0	10.0	5.0
2015	7.0	2.0	10.0	5.0
2016	7.0	2.0	10.0	5.0

V(F). Planned Program (Activity)

1. Activity for the Program

- Developing productive efficient systems to profitably produce a variety of crop and forestry based substrates for biofuels production
- Developing engineering solutions and systems to efficiently convert raw materials into useable fuels
- Exploit bioprocessing systems to produce a variety of compounds thatmight have utility in processing and manufacturing processes
- Advance or knowledge of energy use and conservation in human, agricultural, animal and processing environments
- Communicate solutions and systems to users through extension education and demonstration activities
- Further study of cattails as a feedstock for biofuels

2. Type(s) of methods to be used to reach direct and indirect contacts

Extension

Direct Methods	Indirect Methods
☑ Education Class	☐ Public Service Announcement
☑ Workshop	☐ Billboards
☑ Group Discussion	☑ Newsletters
☑ One-on-One Intervention	☑ TV Media Programs
☑ Demonstrations	☑ Web sites
☐ Other 1	☐ Other 1
☐ Other 2	☐ Other 2

3. Description of targeted audience

Scientists, commercial and limited resource farmers, regulatory entities, homeowners, general public, agribusinesses

V(G). Planned Program (Outputs)

1. Standard output measures

Target for the number of persons(contacts) to be reached through direct and indirect contact

	Direct Contact Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Year	Target	Target	Target	Target
2012	5000	25000	0	0
2013	5000	25000	0	0
2014	5000	25000	0	0
2015	5000	25000	0	0
2016	5000	25000	0	0

2. (Standard Research Target) Number of Patent Applications Submitted

2012:2 **2013:**2 **2014:**2 **2015:**2 **2016:**2

3. Expected Peer Review Publications

Year	Research Target	Extension Target	Total
2012	12	10	22
2013	12	10	22
2014	12	10	22
2015	12	10	22
2016	12	10	22

V(H). State Defined Outputs

1. Output Target

- Studies on producing agricultural and forestry substrates for biofuel production

  2012:10 **2013:**10 **2014:**10 **2015:**10 **2016:**10

- Studies on engineering conversion processes for biofuels and other components

  2012:15 **2013:**15 **2014:**15 **2015:**15 **2016:**15

- Educating homeowners, growers and processors through workshops and other group educational approaches on sustainable energy topics

  2012:25000 **2013:**25000 **2014:**25000 **2015:**25000 **2016:**25000

V(I). State Defined Outcome

O. No	Outcome Name
1	New crops or other biofuels substrates identified
2	New bioprocessing technologies developed
3	New bioproducts identified
4	Number of households improving energy conservation measures
5	Installation of energy saving strategies on animal and crop production facilities

Outcome # 1

1. Outcome Target

New crops or other biofuels substrates identified

2. Outcome Type :

- ○ Change in Knowledge Outcome Measure
- ◉ Change in Action Outcome Measure
- ○ Change in Condition Outcome Measure

2012:5 **2013:**5 **2014:**5 **2015:**5 **2016:**5

3. Associated Knowledge Area(s)

- ☑ 202 - Plant Genetic Resources
- ☑ 205 - Plant Management Systems
- ☐ 401 - Structures, Facilities, and General Purpose Farm Supplies
- ☐ 402 - Engineering Systems and Equipment
- ☐ 403 - Waste Disposal, Recycling, and Reuse
- ☐ 404 - Instrumentation and Control Systems
- ☑ 511 - New and Improved Non-Food Products and Processes

4. Associated Institute Type(s)

- ☑ 1862 Extension
- ☑ 1862 Research
- ☑ 1890 Extension
- ☑ 1890 Research

Outcome # 2

1. Outcome Target

New bioprocessing technologies developed

2. Outcome Type :

- ○ Change in Knowledge Outcome Measure
- ◉ Change in Action Outcome Measure
- ○ Change in Condition Outcome Measure

2012:5 **2013:**5 **2014:**5 **2015:**5 **2016:**5

3. Associated Knowledge Area(s)

- ☐ 202 - Plant Genetic Resources
- ☐ 205 - Plant Management Systems
- ☐ 401 - Structures, Facilities, and General Purpose Farm Supplies
- ☑ 402 - Engineering Systems and Equipment
- ☐ 403 - Waste Disposal, Recycling, and Reuse
- ☐ 404 - Instrumentation and Control Systems
- ☑ 511 - New and Improved Non-Food Products and Processes

4. Associated Institute Type(s)

- ☑ 1862 Extension
- ☑ 1862 Research
- ☑ 1890 Extension
- ☑ 1890 Research

Outcome # 3

1. Outcome Target

New bioproducts identified

2. Outcome Type :

- ○ Change in Knowledge Outcome Measure
- ◉ Change in Action Outcome Measure
- ○ Change in Condition Outcome Measure

2012:5 **2013:**5 **2014:**5 **2015:**5 **2016:**5

3. Associated Knowledge Area(s)

- ☐ 202 - Plant Genetic Resources
- ☐ 205 - Plant Management Systems
- ☐ 401 - Structures, Facilities, and General Purpose Farm Supplies
- ☑ 402 - Engineering Systems and Equipment
- ☑ 403 - Waste Disposal, Recycling, and Reuse
- ☐ 404 - Instrumentation and Control Systems
- ☑ 511 - New and Improved Non-Food Products and Processes

4. Associated Institute Type(s)

- ☑ 1862 Extension
- ☑ 1862 Research
- ☑ 1890 Extension

☑ 1890 Research

Outcome # 4

1. Outcome Target

Number of households improving energy conservation measures

2. Outcome Type :

◯ Change in Knowledge Outcome Measure
◉ Change in Action Outcome Measure
◯ Change in Condition Outcome Measure

2012:25000 **2013:**25000 **2014:**25000 **2015:**25000 **2016:**25000

3. Associated Knowledge Area(s)

☐ 202 - Plant Genetic Resources
☐ 205 - Plant Management Systems
☐ 401 - Structures, Facilities, and General Purpose Farm Supplies
☑ 402 - Engineering Systems and Equipment
☐ 403 - Waste Disposal, Recycling, and Reuse
☐ 404 - Instrumentation and Control Systems
☐ 511 - New and Improved Non-Food Products and Processes

4. Associated Institute Type(s)

☑ 1862 Extension
☑ 1862 Research
☑ 1890 Extension
☑ 1890 Research

Outcome # 5

1. Outcome Target

Installation of energy saving strategies on animal and crop production facilities

2. Outcome Type :

◯ Change in Knowledge Outcome Measure
◉ Change in Action Outcome Measure
◯ Change in Condition Outcome Measure

2012:50 **2013:**50 **2014:**50 **2015:**50 **2016:**50

3. Associated Knowledge Area(s)

- ☐ 202 - Plant Genetic Resources
- ☐ 205 - Plant Management Systems
- ☐ 401 - Structures, Facilities, and General Purpose Farm Supplies
- ☑ 402 - Engineering Systems and Equipment
- ☐ 403 - Waste Disposal, Recycling, and Reuse
- ☐ 404 - Instrumentation and Control Systems
- ☐ 511 - New and Improved Non-Food Products and Processes

4. Associated Institute Type(s)

- ☑ 1862 Extension
- ☑ 1862 Research
- ☑ 1890 Extension
- ☑ 1890 Research

V(J). Planned Program (External Factors)

1. External Factors which may affect Outcomes

- ☑ Natural Disasters (drought, weather extremes, etc.)
- ☑ Economy
- ☑ Appropriations changes
- ☑ Public Policy changes
- ☑ Government Regulations
- ☑ Competing Public priorities
- ☑ Competing Programmatic Challenges
- ☐ Populations changes (immigration, new cultural groupings, etc.)
- ☐ Other

Description

Changing public policy; state, federal and grant funding, and regulatory conditions can impact the relevance and utility of this program. Natural and/or man-made disasters can impact both the conduct and delivery of this program as well as its implementation in the agricultural and forestry communities and the bioprocessing industries.

V(K). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

- ☑ After Only (post program)
- ☑ Retrospective (post program)
- ☐ Before-After (before and after program)
- ☑ During (during program)
- ☐ Time series (multiple points before and after program)
- ☑ Case Study
- ☐ Comparisons between program participants (individuals, group, organizations) and non-participants
- ☐ Comparisons between different groups of individuals or program participants experiencing different levels of program intensity.
- ☐ Comparison between locales where the program operates and sites without program intervention
- ☐ Other

Description

Research and extension programs in this area will produce new knowledge and processes throughout the program. On-going observations of applied research, peer review of articles and observed implementation of new crops, new processes, and energy conservation measure will be documented.

2. Data Collection Methods

- ☑ Sampling
- ☐ Whole population

Survey (Mail, Telephone, On-Site).

- ☐ Mail
- ☐ Telephone
- ☑ On-Site

Interview

- ☑ Structured
- ☐ Unstructured

- ☑ Case Study
- ☑ Observation
- ☐ Portfolio Reviews
- ☐ Tests
- ☐ Journals
- ☐ Other

Description

Depending on the outcome, one or more of these data collection methods will be used to document outcomes and impacts of the program.

V(A). Planned Program (Summary)

Program # 5

1. Name of the Planned Program

Childhood Obesity

2. Brief summary about Planned Program

The Childhood Obesity Planned Program is designed to ensure that nutritious foods are affordable and available to consumers, especially children, and to provide guidance and education so that individuals and families are able to make informed, science-based decisions about how their food choices impact their health and well-being. To meaningfully address the issue of childhood overweight will take education as well as changes in the environment to make healthy eating and physical activity possible for all citizens. Early and continued education of children about the importance of eating smart and moving more is critical. However, adult eating and physical activity must also be addressed as they have significant influence on children's eating and physical activity patterns especially early in life. Families are the foundation of the solution to overweight and obesity. They provide children's first learning environment and have the potential to make that environment supportive of healthy eating and physical activity patterns that prevent childhood overweight. Families can also be powerful advocates for environmental and policy change to support healthy eating and physical activity outside the home. Schools are also places of extraordinary influence on behavior and the development of lifelong behavior patterns. This influence stems not only from educational offerings, but also from environmental cues, role modeling, and peer influence. Science-based educational programs addressing diet, healthy food choices, and chronic disease prevention will be offered to North Carolinians of diverse income levels, age groups, genders, and/or cultural backgrounds across the state. NC Cooperative Extension works to reach participants using a variety of delivery techniques. Schools, worksites, and faith communities offer opportunity to reach participants in a group setting. We also employ technology through online delivery of education and through eXtension's Families, Food and Fitness Community of Practice to reach even more citizens with research-based information. In addition, we work with policy makers at the local and state level to inform them of policies that would support healthy eating, physical activity, and good health in adults and children.

3. Program existence :

- ◯ New (One year or less)
- ◉ Intermediate (One to five years)
- ◯ Mature (More than five years)

4. Program duration :

- ◯ Short-Term(One year or less)
- ◯ Medium-Term (One to five years)
- ◉ Long-Term (More than five years)

5. Expending formula funds or state-matching funds :

- ◉ Yes
- ◯ No

6. Expending other than formula funds or state-matching funds :

- ◉ Yes
- ◯ No

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
702	Requirements and Function of Nutrients and Other Food Components	20%	20%	50%	0%
703	Nutrition Education and Behavior	30%	30%	30%	50%
724	Healthy Lifestyle	50%	50%	20%	50%
	Total	100%	100%	100%	100%

V(C). Planned Program (Situation and Scope)

1. Situation and priorities

Overweight and obesity are arguably the number one public health crisis of our time. Since 1980, the level of overweight and obesity in children and adolescents has tripled. Thirty-two percent of children ages 2 to 19 are overweight or obese. Seventeen percent of children fall into the obese category, and rates are greater in limited-resource, African-American and Hispanic children. And over the past 30 years, there has been an astounding increase in the number of adults who are overweight or obese. It is estimated that nearly 70% of adults in the US are overweight or obese. The rate has doubled since the early 1980's.

Public interest and concern about nutrition and health issues are major issues in our society. And while more consumers and their families than ever are aware of these issues, fewer can put concepts of sound nutrition and healthy lifestyles into everyday practice. Consumers continue to need help in using current Dietary Guidelines for Americans and MyPyramid.gov to incorporate balance, moderation and variety in their diets as well as to increase physical activity. Dietary factors are associated with five of the ten leading causes of death in our state and the USA, including coronary heart disease, some types of cancer, stroke, noninsulin-dependent diabetes mellitus, and atherosclerosis. Overweight and obesity have

reached epidemic proportions and have become one of the most pressing health issues for our nation and state, regardless of age group, race and ethnicity.

2. Scope of the Program

- ☑ In-State Extension
- ☑ In-State Research
- ☐ Multistate Research
- ☑ Multistate Extension
- ☑ Integrated Research and Extension
- ☐ Multistate Integrated Research and Extension

V(D). Planned Program (Assumptions and Goals)

1. Assumptions made for the Program

Continued funding at current level
State and county staff to support the program
External grants to leverage federal, state and local funding

2. Ultimate goal(s) of this Program

North Carolinians, including children and their families and limited resource individuals, will improve the quality of their lives through eating healthy, being active, managing resources for food security, and practicing health-promoting behaviors.

V(E). Planned Program (Inputs)

1. Estimated Number of professional FTE/SYs to be budgeted for this Program

Year	Extension		Research	
	1862	1890	1862	1890
2012	35.0	3.0	12.0	3.0
2013	35.0	3.0	12.0	3.0
2014	35.0	3.0	12.0	3.0
2015	35.0	3.0	12.0	3.0
2016	35.0	3.0	12.0	3.0

V(F). Planned Program (Activity)

1. Activity for the Program

The Childhood Obesity Planned Program will provide science-based educational and experiential learning opportunities that focus on children, but actively engage an array of audiences--regardless of gender, income, age or race/ethnicity--because of the influence that these groups in society have on the health and well-being of themselves and their children. Programs developed and provided by NC

Cooperative Extension in the area of healthy weight for children and adults is part of the larger initiative Eat Smart, Move More North Carolina. As a founding member of the movement, our programs are part of a larger effort to educate and change environments so that all North Carolinians have the opportunity to eat smart and move more. Important program activities include: **EFNEP**, the Expanded Food and Nutrition Education Program, is a federally funded educational program administered in North Carolina through NC State University and NC A & T State University. For more than three decades, EFNEP has been helping limited resource youth and families with children learn how to eat healthier meals and snacks, stretch their food dollars and reduce the risk of food-borne illnesses. The Supplemental Nutrition Assistance Program-Education (**SNAP-Ed**) serves limited resource families across North Carolina to assist those eligible for food assistance to eat smart and move more. SNAP-Ed works to help participants make healthy choices within a limited budget and choose physically active lifestyles. NC State University's SNAP-Ed Program is Steps to Health, which works with preschoolers, kindergarteners, 2nd grade students, 3rd grade students, and high school students. **Color Me Healthy**is a program developedto reach limited resource children ages four and five. Color MeHealthy uses color, music, and explorationof the senses to teach children that healthyfood and physical activity are fun. Agents train child care providers in the use of the program in their setting. **Faithful Families Eating Smart and Moving More** is a program that helpsfaith communities in North Carolina make and sustain changes that promote healthy eating and physical activity. **Eat Smart, Move More Weigh Less**(ESMMWL) is a weight-management program for adults. This 15-week evidence-based program includes strategies proven to work to achieve and maintain a healthy weight and encourages small changes that can be sustained over time. The program includes a family component to influence the eating and physical activity of all family members. **Cook Smart, Eat Smart** is a program that teaches simple, basic cooking for teens and adults. Eating more meals at home is an important strategy for eating a healthy diet. Cook Smart, Eat Smart provides hands on education on how to plan, shop, fix and eat healthy family meals.In addition to the methods mentioned earlier, social media tools will be used by researchers as a means of helping to reinforce information about healthy eating and physical activity behaviors among adolescents.

2. Type(s) of methods to be used to reach direct and indirect contacts

Extension

Direct Methods	Indirect Methods
☑ Education Class	☑ Public Service Announcement
☑ Workshop	☐ Billboards
☐ Group Discussion	☑ Newsletters
☑ One-on-One Intervention	☑ TV Media Programs
☑ Demonstrations	☑ Web sites
☐ Other 1	☐ Other 1
☐ Other 2	☐ Other 2

3. Description of targeted audience

Intended audiences include children of all ages, youth, their adult family members, child-care providers, Head Start workers, food banks, food stamp and WIC recipients and community coalitions. No time is more critical than childhood to promote healthy eating and sound health practices. Children do not consume sufficient fruits or vegetables and have diets that are low in fiber and higher in fat than recommended. Children 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 continues to rise. Treatment of overweight and obesity is difficult. Prevention of overweight and obesity in children is essential to address this issue. Demographic changes in the state's population continue to impact nutrition and health issues. The fastest growing age group is the 65 years and older segment, and the elderly have disproportionate risk of malnutrition and poverty, as well as poor overall health, and in many cases they are either care-givers or influence the care of children. Because of the influence that adults have with different age groups, and because of their own health concerns, healthy nutrition and well-being educational programs are important for adults as well. Programs addressed to young adults and middle-aged consumers will continue to impact the health of the population as it ages, but including children as well. Women are employed outside the home in greater numbers, and many of them are among the working poor. Over 80% of women who had school-aged children were working outside the home; 67% of women with the 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 is a major concern, as it relates to nutrition, health, and obesity as well as other developmental needs of children.

V(G). Planned Program (Outputs)

1. Standard output measures

Target for the number of persons(contacts) to be reached through direct and indirect contact

	Direct Contact Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Year	Target	Target	Target	Target
2012	98000	99000	25500	42500
2013	99000	100000	25500	42500
2014	100000	100000	25500	42500
2015	100000	100000	25500	42500
2016	100000	100000	25500	42500

2. (Standard Research Target) Number of Patent Applications Submitted

2012:0 **2013:**0 **2014:**0 **2015:**0 **2016:**0

3. Expected Peer Review Publications

Year	Research Target	Extension Target	Total
2012	4	12	16
2013	4	12	16
2014	4	12	16
2015	4	12	16
2016	4	12	14

V(H). State Defined Outputs

1. Output Target

- Non-degree credit group activities conducted on Foods and Nutrition and Childhood Obesity Education

  2012:2200 **2013:**2200 **2014:**2200 **2015:**2200 **2016:**2200

- Targeted audiences participate in workshops on Food, Nutrition and Childhood Obesity

  2012:19000 **2013:**19000 **2014:**19000 **2015:**19000 **2016:**19000

V(I). State Defined Outcome

O. No	Outcome Name
1	Program participants increase knowledge that will promote a healthier diet
2	Program participants increase skills that will promote a healthier diet
3	Education program participants make one or more positive dietary changes
4	Program participant decrease body weight
5	Program participants decrease blood pressure
6	Program participants increase physical activity
7	Program participants increase their fruit and vegetable consumption by at least one serving

Outcome # 1

1. Outcome Target

Program participants increase knowledge that will promote a healthier diet

2. Outcome Type :

- (●) Change in Knowledge Outcome Measure
- ( ) Change in Action Outcome Measure
- ( ) Change in Condition Outcome Measure

2012:20900 **2013:**20900 **2014:**20900 **2015:**20900 **2016:**20900

3. Associated Knowledge Area(s)

- ☑ 702 - Requirements and Function of Nutrients and Other Food Components
- ☑ 703 - Nutrition Education and Behavior
- ☑ 724 - Healthy Lifestyle

4. Associated Institute Type(s)

- ☑ 1862 Extension
- ☑ 1862 Research
- ☑ 1890 Extension
- ☑ 1890 Research

Outcome # 2

1. Outcome Target

Program participants increase skills that will promote a healthier diet

2. Outcome Type :

- (●) Change in Knowledge Outcome Measure
- ( ) Change in Action Outcome Measure
- ( ) Change in Condition Outcome Measure

2012:20900 **2013:**20900 **2014:**20900 **2015:**20900 **2016:**20900

3. Associated Knowledge Area(s)

- ☑ 702 - Requirements and Function of Nutrients and Other Food Components
- ☑ 703 - Nutrition Education and Behavior
- ☑ 724 - Healthy Lifestyle

4. Associated Institute Type(s)

- ☑ 1862 Extension
- ☑ 1862 Research
- ☑ 1890 Extension
- ☑ 1890 Research

Outcome # 3

1. Outcome Target

Education program participants make one or more positive dietary changes

2. Outcome Type :

- ○ Change in Knowledge Outcome Measure
- ◉ Change in Action Outcome Measure
- ○ Change in Condition Outcome Measure

2012:16850 **2013:**16850 **2014:**16850 **2015:**16850 **2016:**16850

3. Associated Knowledge Area(s)

- ☑ 702 - Requirements and Function of Nutrients and Other Food Components
- ☑ 703 - Nutrition Education and Behavior
- ☑ 724 - Healthy Lifestyle

4. Associated Institute Type(s)

- ☑ 1862 Extension
- ☑ 1862 Research
- ☑ 1890 Extension
- ☑ 1890 Research

Outcome # 4

1. Outcome Target

Program participant decrease body weight

2. Outcome Type :

- ○ Change in Knowledge Outcome Measure
- ○ Change in Action Outcome Measure
- ◉ Change in Condition Outcome Measure

2012:1300 **2013:**1300 **2014:**1300 **2015:**1300 **2016:**1300

3. Associated Knowledge Area(s)

- ☐ 702 - Requirements and Function of Nutrients and Other Food Components
- ☑ 703 - Nutrition Education and Behavior
- ☑ 724 - Healthy Lifestyle

4. Associated Institute Type(s)

- ☑ 1862 Extension
- ☑ 1862 Research
- ☑ 1890 Extension
- ☑ 1890 Research

Outcome # 5

1. Outcome Target

Program participants decrease blood pressure

2. Outcome Type :

- ○ Change in Knowledge Outcome Measure
- ○ Change in Action Outcome Measure
- ◉ Change in Condition Outcome Measure

2012:1500 **2013:**1500 **2014:**1500 **2015:**1500 **2016:**1500

3. Associated Knowledge Area(s)

- ☐ 702 - Requirements and Function of Nutrients and Other Food Components
- ☑ 703 - Nutrition Education and Behavior
- ☑ 724 - Healthy Lifestyle

4. Associated Institute Type(s)

- ☑ 1862 Extension
- ☐ 1862 Research

- ☑ 1890 Extension
- ☐ 1890 Research

Outcome # 6

1. Outcome Target

Program participants increase physical activity

2. Outcome Type :

- ○ Change in Knowledge Outcome Measure
- ◉ Change in Action Outcome Measure
- ○ Change in Condition Outcome Measure

2012:2000 **2013:**2000 **2014:**2000 **2015:**2000 **2016:**2000

3. Associated Knowledge Area(s)

- ☐ 702 - Requirements and Function of Nutrients and Other Food Components
- ☑ 703 - Nutrition Education and Behavior
- ☑ 724 - Healthy Lifestyle

4. Associated Institute Type(s)

- ☑ 1862 Extension
- ☑ 1862 Research
- ☑ 1890 Extension
- ☑ 1890 Research

Outcome # 7

1. Outcome Target

Program participants increase their fruit and vegetable consumption by at least one serving

2. Outcome Type :

- ○ Change in Knowledge Outcome Measure
- ◉ Change in Action Outcome Measure
- ○ Change in Condition Outcome Measure

2012:2000 **2013:**2000 **2014:**2000 **2015:**2000 **2016:**2000

3. Associated Knowledge Area(s)

- ☑ 702 - Requirements and Function of Nutrients and Other Food Components
- ☑ 703 - Nutrition Education and Behavior

- ☑ 724 - Healthy Lifestyle

4. Associated Institute Type(s)

- ☑ 1862 Extension
- ☑ 1862 Research
- ☑ 1890 Extension
- ☑ 1890 Research

V(J). Planned Program (External Factors)

1. External Factors which may affect Outcomes

- ☑ Natural Disasters (drought, weather extremes, etc.)
- ☑ Economy
- ☑ Appropriations changes
- ☑ Public Policy changes
- ☑ Government Regulations
- ☑ Competing Public priorities
- ☑ Competing Programmatic Challenges
- ☑ Populations changes (immigration, new cultural groupings, etc.)
- ☐ Other

Description

Possible reduction in budget support for program area, reductions in state and county staff that develop and implement programs, natural disasters that impact extension's ability to deliver programs (due to budget, travel and time restrictions), changes in public policy or mandates that relate to the program area, and increases in minority and ethnic populations. Availability of adequate grant funds is also a major external factor.

V(K). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

- ☑ After Only (post program)
- ☐ Retrospective (post program)
- ☑ Before-After (before and after program)
- ☑ During (during program)
- ☐ Time series (multiple points before and after program)
- ☑ Case Study
- ☑ Comparisons between program participants (individuals, group, organizations) and non-participants

- ☐ Comparisons between different groups of individuals or program participants experiencing different levels of program intensity.
- ☐ Comparison between locales where the program operates and sites without program intervention
- ☐ Other

Description

Extension educators will conduct evaluations to determine the impact of education programs and activities. The educational program, funding requirements and learning objectives for the program will determine the type of evaluation study conducted. County agents will also collect success stories that will serve as case study example of program impact. Extension publications will be reviewed by peers of extension educators. Researchfaculty will conduct assessments before the program to determine the participants' level of knowledge on topic. Assessments will also be performed during the study and after to determine change in participants' knowledge and application.

2. Data Collection Methods

- ☑ Sampling
- ☑ Whole population

Survey (Mail, Telephone, On-Site).

- ☑ Mail
- ☑ Telephone
- ☑ On-Site

Interview

- ☐ Structured
- ☑ Unstructured

- ☐ Case Study
- ☑ Observation
- ☐ Portfolio Reviews
- ☐ Tests
- ☐ Journals
- ☐ Other

Description

Extension educators and researcherswill use a variety of methods to collect data. The target group for evaluation, type of program, information to be gathered and available funding will determine the specific method used for evaluation. Evaluation methods will include, but are not limited to, whole population sampling, on-site surveys and mail surveys. Researchers and county agents will also collect success stories that will serve as case study example of program impact.

V(A). Planned Program (Summary)

Program # 6

1. Name of the Planned Program

Food Safety - Food Production Systems: Development, Processing and Quality

2. Brief summary about Planned Program

In North Carolina, the food industry has grown, diversified, and become a vital economic force for the state by providing jobs and adding value to raw agricultural products marketed worldwide. To continue the production of a high quality, safe, secure, and nutritious food supply and to sustain this dynamic industry requires the participation of discipline-focused basic and applied research and outreach activities that target all phases of the food production to table continuum. Faculties from multiple departments across NCSU and NC A&T will be directly engaged in activities that support the primary goals of this plan of work. For example, the NC Market Ready program, which is part of the Plants for Human Health Institute at the NC Research Campus in Kannapolis and a collaborative effort involving both land grant institutions, develops and delivers research based training and information to enable growers to provide ample supplies of safe fresh produce. Some of their educational and training efforts include business planning and management, production technology, GAPS development and training and involvement with a state-wide Fresh Produce Safety Task Force. Four programmatic aims of the Task Force are to 1)Works to ensure that the fresh produce industry understands and implements GAPs through effective and dynamic educational programs; 2) Works to ensure that research-based crop production and management guidelines are used to maximize produce safety; 3) Works to ensure that industry and public policy decisions regarding fresh produce safety are informed by science-based information, and 4) Works to ensure that a network of government, university and industry collaborators work together in an effective and timely manner to communicate and address food safety incidences and concerns. Many clientele groups will be directly or indirectly involved including producers, processors, agribusiness personnel, food retailers, and the general public. Following discovery, new food production, processing, and monitoring practices and technologies leading to new and improved value-added products will be disseminated to appropriate clientele groups using numerous educational and outreach methods. All participants and plans of work will be assessed at least yearly to assure continued progress and success.

3. Program existence :

- ○ New (One year or less)
- ◉ Intermediate (One to five years)
- ○ Mature (More than five years)

4. Program duration :

- ○ Short-Term(One year or less)
- ○ Medium-Term (One to five years)
- ◉ Long-Term (More than five years)

5. Expending formula funds or state-matching funds :

- ◉ Yes
- ○ No

6. Expending other than formula funds or state-matching funds :

- ◉ Yes
- ○ No

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
501	New and Improved Food Processing Technologies	15%	15%	20%	25%
502	New and Improved Food Products	15%	15%	15%	30%
503	Quality Maintenance in Storing and Marketing Food Products	10%	10%	10%	20%
504	Home and Commercial Food Service	10%	10%	5%	0%
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources	10%	10%	10%	0%
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins	40%	40%	40%	25%
	Total	100%	100%	100%	100%

V(C). Planned Program (Situation and Scope)

1. Situation and priorities

Food producers and processors will continue to strive to efficiently produce an abundant supply of high quality, safe, and nutritious supply of affordable food products. Even with the food industry's best efforts, new challenges and heightened expectations of consumers are naturally present and so will require the assistance from the land grant university system. The public's expectations of a safe and secure food system have put enormous pressure on the food industry, especially in light of several

significant fresh produce contamination induced recalls in recent years that impact growers and suppliers economically and undermine other positive forces to encourage increased consumption of fresh fruits and vegetable for health benefits. Since the events of 9/11/01, such contemporary issues as food biosecurity have added new meaning to food safety as the nation struggles with the awesome task of securing our food supply. To be successful, this plan of work must engage a broad group of participants including, but not limited to, NCSU and NCA&T faculty and staff, North Carolina Cooperative Extension personnel, farmers, food processors, agribusiness personnel, local, state and federal regulatory officials, elected officials, food retailers, and the general public. To assure an abundant supply of high quality, safe, secure, nutritious, and affordable food products will require the expanded utilization and improvement of raw food materials, development of new efficient processing technologies, improved food quality, safety, security and traceability monitoring procedures, and methods for preventing, eliminating or reducing to an acceptable level microbiological and chemical safety hazards. Many of these accomplishments will be achieved in university laboratories and field trials yet the ultimate success will be based on the discoveries being translated into useful practices that are adopted by the food industry and other stakeholders. Thus, effective means of communicating research findings to appropriate stakeholder groups and training food industry personnel about appropriate handling procedures will also be identified and implemented through university-sponsored programs.

2. Scope of the Program

- ☑ In-State Extension
- ☑ In-State Research
- ☑ Multistate Research
- ☑ Multistate Extension
- ☑ Integrated Research and Extension
- ☑ Multistate Integrated Research and Extension

V(D). Planned Program (Assumptions and Goals)

1. Assumptions made for the Program

The basic assumptions to satisfactorily accomplish the stated goals of this plan of work would include having adequate funding and a critical number of faculty, support staff, and graduate students to support the proposed research and outreach efforts. Other assumptions are that project participants will take advantage of opportunities as they arise, will be successful in identifying solutions to the stated problems, will effectively deliver the findings to the targeted stakeholders, that the stakeholders will put into practice the new knowledge, practices, and technologies, and that companies will be able to sustain their businesses by producing affordable food products that are of high quality, safe, secure, and nutritious.

2. Ultimate goal(s) of this Program

Foods produced in North Carolina as a result of discoveries and outreach activities described in this project will be high quality, safe and secure, and highly nutritious so as to assure the sustainability of the food industry and enhance consumer confidence.

V(E). Planned Program (Inputs)

1. Estimated Number of professional FTE/SYs to be budgeted for this Program

Year	Extension		Research	
	1862	1890	1862	1890

Year	Extension		Research	
	1862	1890	1862	1890
2012	54.0	2.0	55.0	6.0
2013	54.0	2.0	55.0	6.0
2014	54.0	2.0	55.0	6.0
2015	54.0	2.0	55.0	6.0
2016	54.0	2.0	55.0	6.0

V(F). Planned Program (Activity)

1. Activity for the Program

Multiple research and educational outreach programs will be conducted under the umbrella of improving the quality, safety, security, and nutrition of food products produced in North Carolina. Specific research projects will identify effective nutritional control strategies for replacement of growth-promoting antibiotics for improving gut function and reducing intestinal colonization and shedding of Salmonella; assessing the incidence, populations, serotypes, genotypes, and antibiotic susceptibility of Salmonella and Campylobacter fecal isolates as a function of farm, bird age, season, management practices, and strategic processing of commercial broiler, turkey, and layer farms; assessing novel antimicrobial strategies for use in reducing foodborne pathogens and biofilm formation on food processing contact surfaces; employing the antimicrobial properties of eggshell membranes for reducing the heat resistance of foodborne pathogens; development of Salmonella-specific inhibitory nanoparticles for preventing intestinal colonization; development of alternative layer molting diets for reducing the risk of Salmonella contamination of shell eggs; characterization of Campylobacter respiratory chain genes for use in developing rational drugs for controlling infection of food animals; conduct ecotoxicological studies to identify chemical pollutant sources that contaminate aquatic human foods; development of a high hydrostatic pressure system for reducing toxigenic histamine-forming bacteria in scombroid fish and vacuum and MAP packaged fresh tuna; develop a more efficient means of producing a high-gelling protein isolate from underutilized fish species and other meat sources that could replace surimi manufacture and improve the quality, sensory and yield characteristics of new and existing muscle food products; development of a Vienna sausage product without casings via an in-tube focused microwave field heating technology; improving the texture and yield of canned/pouched Albacore tuna by controlling precook proteolysis and injection of a tuna-derived protein isolate; application of continuous flow processing of foods and biomaterials using advanced focused microwave technology; and development and testing of tools, methods and devices for rapid sterilization and production of high quality vegetable and fruit purees; isolating, identifying and characterizing bioactive compounds from peanuts skin, sweet potato peels/flesh, pokeweed roots and rosehip fruits and wine grapes skins /seeds; developing value-added products incorporating bioactive compounds from select extracts and evaluating them for consumer acceptability; exploring industry partnerships for commercial utilization of prototyped products incorporating bioactive extracts; and isolating the most active fractions from pokeweed and rose hip that show strong antiproliferative and apoptosis activity against breast, colon, and cervical cancer cells.A very important aspect of this plan of work is to transfer technology and knowledge to our stakeholders and clientele, including efforts of the Plants for Human Health Institute's NC Market Ready and NC Fresh Produce Safety Task Force.

2. Type(s) of methods to be used to reach direct and indirect contacts

Extension

Direct Methods	Indirect Methods
☑ Education Class	☑ Public Service Announcement
☑ Workshop	☐ Billboards
☑ Group Discussion	☑ Newsletters
☑ One-on-One Intervention	☑ TV Media Programs
☑ Demonstrations	☑ Web sites
☑ Other 1 (Short Courses)	☑ Other 1 (Trade Journals)
☑ Other 2 (Scientific Meetings)	☑ Other 2 (Scientific Journals)

3. Description of targeted audience

Primary food producers, food processors, foodservice operators, county extension agents, state and federal regulatory agencies, commodity associations, news media and consumers. The primary audience will be in North Carolina but will also extend to audiences in other states (state and federal agencies, local, state and federal politicians and other stakeholders).

V(G). Planned Program (Outputs)

1. Standard output measures

Target for the number of persons(contacts) to be reached through direct and indirect contact

	Direct Contact Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Year	Target	Target	Target	Target
2012	4450	49350	100	120
2013	4450	49900	100	120
2014	4500	49900	100	120
2015	4600	51100	275	125
2016	4600	115000	275	125

2. (Standard Research Target) Number of Patent Applications Submitted

2012:6 **2013:**7 **2014:**7 **2015:**8 **2016:**8

3. Expected Peer Review Publications

Year	Research Target	Extension Target	Total
2012	68	12	80

Year	Research Target	Extension Target	Total
2013	68	12	80
2014	68	12	80
2015	75	10	85
2016	75	10	85

V(H). State Defined Outputs

1. Output Target

- Highly focused non-degree credit group training activities to be conducted

  2012:400 **2013:**400 **2014:**400 **2015:**400 **2016:**400

- Relevant and impacts focused research projects to be conducted

  2012:50 **2013:**50 **2014:**50 **2015:**52 **2016:**52

- Local, area, regional and state conferences to be conducted

  2012:20 **2013:**20 **2014:**20 **2015:**18 **2016:**18

- Number of firms adopting quality and safety strategies

  2012:253 **2013:**254 **2014:**255 **2015:**256 **2016:**256

- # Presentations at professional meetings

  2012:8 **2013:**9 **2014:**12 **2015:**15 **2016:**15

- # Media occurrences reporting research findings

  2012:10 **2013:**11 **2014:**13 **2015:**13 **2016:**13

V(I). State Defined Outcome

O. No	Outcome Name
1	Number of program participants who successfully pass the food safety certification examination
2	Number of participants completing National Seafood HACCP Alliance Education and other food safety HACCP workshops
3	Number of companies adopting new technologies
4	Number of new companies in food manufacturing
5	Number of food industry companies undergoing equipment and food safety audits
6	Number of new food products that industry can manufacture to improve health

Outcome # 1

1. Outcome Target

Number of program participants who successfully pass the food safety certification examination

2. Outcome Type :

- (●) Change in Knowledge Outcome Measure
- ( ) Change in Action Outcome Measure
- ( ) Change in Condition Outcome Measure

2012:1350	**2013:**1350	**2014:**1350	**2015:**1400	**2016:**1400

3. Associated Knowledge Area(s)

- ☑ 501 - New and Improved Food Processing Technologies
- ☑ 502 - New and Improved Food Products
- ☑ 503 - Quality Maintenance in Storing and Marketing Food Products
- ☑ 504 - Home and Commercial Food Service
- ☑ 711 - Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and
- ☑ 712 - Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally

4. Associated Institute Type(s)

- ☑ 1862 Extension
- ☑ 1862 Research
- ☑ 1890 Extension
- ☐ 1890 Research

Outcome # 2

1. Outcome Target

Number of participants completing National Seafood HACCP Alliance Education and other food safety HACCP workshops

2. Outcome Type :

- (●) Change in Knowledge Outcome Measure
- ( ) Change in Action Outcome Measure
- ( ) Change in Condition Outcome Measure

2012:550	**2013:**600	**2014:**600	**2015:**620	**2016:**620

3. Associated Knowledge Area(s)

- ☑ 501 - New and Improved Food Processing Technologies
- ☑ 502 - New and Improved Food Products
- ☑ 503 - Quality Maintenance in Storing and Marketing Food Products
- ☑ 504 - Home and Commercial Food Service
- ☑ 711 - Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and
- ☐ 712 - Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally

4. Associated Institute Type(s)

- ☑ 1862 Extension
- ☑ 1862 Research
- ☐ 1890 Extension
- ☐ 1890 Research

Outcome # 3

1. Outcome Target

Number of companies adopting new technologies

2. Outcome Type :

- ◉ Change in Knowledge Outcome Measure
- ◯ Change in Action Outcome Measure
- ◯ Change in Condition Outcome Measure

2012:70 **2013:**70 **2014:**70 **2015:**68 **2016:**68

3. Associated Knowledge Area(s)

- ☑ 501 - New and Improved Food Processing Technologies
- ☑ 502 - New and Improved Food Products
- ☑ 503 - Quality Maintenance in Storing and Marketing Food Products
- ☐ 504 - Home and Commercial Food Service
- ☑ 711 - Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and
- ☑ 712 - Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally

4. Associated Institute Type(s)

- ☑ 1862 Extension
- ☑ 1862 Research
- ☑ 1890 Extension
- ☑ 1890 Research

Outcome # 4

1. Outcome Target

Number of new companies in food manufacturing

2. Outcome Type :

- (●) Change in Knowledge Outcome Measure
- ( ) Change in Action Outcome Measure
- ( ) Change in Condition Outcome Measure

2012:10 **2013:**10 **2014:**10 **2015:**8 **2016:**8

3. Associated Knowledge Area(s)

- ☑ 501 - New and Improved Food Processing Technologies
- ☑ 502 - New and Improved Food Products
- ☑ 503 - Quality Maintenance in Storing and Marketing Food Products
- ☑ 504 - Home and Commercial Food Service
- ☑ 711 - Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and
- ☑ 712 - Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally

4. Associated Institute Type(s)

- ☑ 1862 Extension
- ☑ 1862 Research
- ☑ 1890 Extension
- ☑ 1890 Research

Outcome # 5

1. Outcome Target

Number of food industry companies undergoing equipment and food safety audits

2. Outcome Type :

- ( ) Change in Knowledge Outcome Measure
- (●) Change in Action Outcome Measure
- ( ) Change in Condition Outcome Measure

2012:25 **2013:**25 **2014:**25 **2015:**28 **2016:**28

3. Associated Knowledge Area(s)

- ☐ 501 - New and Improved Food Processing Technologies
- ☐ 502 - New and Improved Food Products
- ☐ 503 - Quality Maintenance in Storing and Marketing Food Products
- ☐ 504 - Home and Commercial Food Service
- ☑ 711 - Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and
- ☑ 712 - Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally

4. Associated Institute Type(s)

- ☑ 1862 Extension
- ☐ 1862 Research
- ☑ 1890 Extension
- ☐ 1890 Research

Outcome # 6

1. Outcome Target

Number of new food products that industry can manufacture to improve health

2. Outcome Type :

- ○ Change in Knowledge Outcome Measure
- ◉ Change in Action Outcome Measure
- ○ Change in Condition Outcome Measure

2012:1 **2013:**1 **2014:**2 **2015:**2 **2016:**2

3. Associated Knowledge Area(s)

- ☐ 501 - New and Improved Food Processing Technologies
- ☑ 502 - New and Improved Food Products
- ☐ 503 - Quality Maintenance in Storing and Marketing Food Products
- ☐ 504 - Home and Commercial Food Service
- ☐ 711 - Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and
- ☐ 712 - Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally

4. Associated Institute Type(s)

- ☐ 1862 Extension
- ☑ 1862 Research
- ☐ 1890 Extension
- ☑ 1890 Research

V(J). Planned Program (External Factors)

1. External Factors which may affect Outcomes

- ☑ Natural Disasters (drought, weather extremes, etc.)
- ☑ Economy
- ☑ Appropriations changes
- ☑ Public Policy changes
- ☑ Government Regulations
- ☑ Competing Public priorities
- ☑ Competing Programmatic Challenges
- ☑ Populations changes (immigration, new cultural groupings, etc.)
- ☑ Other (National public health problem)

Description

Anything that competes for public funding or that affects public policy can have an impact on this plan of work. Should significant external factors occur, many of the participants in this plan of work could have their funding, activities, or both re-directed. Changes in appropriations could affect funding support while changes in food regulations, public priorities, and population changes could affect specific program activities. Catastrophic events, such as hurricanes, could seriously affect funding and program activities for extended periods of time.

V(K). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

- ☑ After Only (post program)
- ☑ Retrospective (post program)
- ☑ Before-After (before and after program)
- ☑ During (during program)
- ☐ Time series (multiple points before and after program)
- ☐ Case Study
- ☑ Comparisons between program participants (individuals, group, organizations) and non-participants
- ☑ Comparisons between different groups of individuals or program participants experiencing different levels of program intensity.
- ☐ Comparison between locales where the program operates and sites without program intervention
- ☐ Other

Description

Evaluation is a basic component of most funded projects. Some studies will attempt to quantify pre-investigation baseline parameters and then estimate change caused by the implementation of specific practices, technologies, discoveries. Other studies will seek to quantify the rate of change during a program. When possible, program participants will be compared to a non-participatory control group. All programs will be evaluated at least yearly to measure effect and impact. Stakeholders and clientele will be surveyed periodically to determine the relevance of current programs and to ascertain the need for redirection of programs.

2. Data Collection Methods

- ☑ Sampling
- ☑ Whole population

Survey (Mail, Telephone, On-Site).

- ☑ Mail
- ☑ Telephone
- ☑ On-Site

Interview

- ☑ Structured
- ☑ Unstructured

- ☐ Case Study
- ☑ Observation
- ☐ Portfolio Reviews
- ☑ Tests
- ☐ Journals
- ☐ Other

Description

Evaluation of program effectiveness will be tracked through the Extension Learning Management System and through the Extension Reporting System where campus and field faculty report success stories and program impacts. Stakeholder input will be gathered using a variety of methods -- surveys, environmental scans and during advisory board meetings and other forums such as workshops, conferences and short courses.

V(A). Planned Program (Summary)

Program # 7

1. Name of the Planned Program

Human and Community Development- Youth Development and Families

2. Brief summary about Planned Program

This program was developed to assist families with developing basic skills such as: setting family and financial goals, developing a spending and servings plan, understanding credit and the credit report, reducing debt and preparing for retirement, to enhance family resilience, and continuity. The program involves empowering individuals and families and ultimately their communities by increasing their financial knowledge and capacity to develop effective strategies to address life issues relating to employment, income, and management of finances. Financial security also has implications for achievement of essential needs such as adequate nutrition, shelter (housing), health services access, safety, and security. NCA&T Family and Consumer Science Agents and Specialists have partnered with the College of Agriculture and Life Sciences at North Carolina State Universityto create a program that provides educational learning experiences for **improving the quality of life for limited resource families** through increased knowledge and skills in parenting, interpersonal relationships, and utilizing community resources. Improved financial management skills and practices that promote asset building can serve as important anti-poverty strategy. This planned program will also reach out to other underserved populations in the state including rural eastern and mountain communities along with a growing Hispanic population. Research will also be done to find out how communities, families and individuals adapt to changes in government policies that impact their economic well-being. **Developing Responsible Youth Program is** a collaborative initiative of the North Carolina 4-H Youth Development Program, the Department of 4-H Youth Development and Family & Consumer Sciences in the College of Agriculture and Life Sciences at North Carolina State University, and the Cooperative Extension Program at North Carolina A&T State University. The program is designed to encourage positive youth outcomes by providing a curriculum of activities that feature: a positive relationship with a caring adult; a physically and emotionally safe environment; the opportunity to value and practice service for others; an opportunity for self-determination; an inclusive environment; an opportunity to see oneself as an active participant in the future; engagement in learning, and opportunity for mastery. The goal of this collaborative effort is to actively engage youth, volunteers, stakeholders, and youth development professionals "to create helping relationships to enable youths to become responsible, productive citizens." Through 4-H and other, allied youth development programs, young people can be empowered to invest and grow cognitive, social, physical and emotional skills to reach their full potential for becoming coping, competent and contributing participants in their friendship and peer groups, families, schools and communities. The Initiative focuses on utilization of experiential, non-formal, community based youth development practices which recognize the worth and dignity of every individual.

3. Program existence :

- ○ New (One year or less)
- ◉ Intermediate (One to five years)
- ○ Mature (More than five years)

4. Program duration :

- ○ Short-Term(One year or less)
- ○ Medium-Term (One to five years)
- ◉ Long-Term (More than five years)

5. Expending formula funds or state-matching funds :

- ◉ Yes
- ○ No

6. Expending other than formula funds or state-matching funds :

- ◉ Yes
- ○ No

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
607	Consumer Economics	10%	5%	0%	0%
801	Individual and Family Resource Management	15%	20%	25%	0%
802	Human Development and Family Well-Being	25%	25%	25%	25%
803	Sociological and Technological Change Affecting Individuals, Families, and Communities	10%	10%	0%	25%
804	Human Environmental Issues Concerning Apparel, Textiles, and Residential and Commercial Structures	10%	15%	25%	25%
805	Community Institutions, Health, and Social Services	10%	5%	0%	25%
806	Youth Development	20%	20%	25%	0%
	Total	100%	100%	100%	100%

V(C). Planned Program (Situation and Scope)

1. Situation and priorities

The basic unit of society is the family. Rapid changes in society create multiple family challenges and stressors. Concerns arise regarding childcare, child abuse, coping with parenting, grand parenting, and financial stress. Families, especially those with limited resources often are unable to adequately address their children's needs. Children whose parents have serious problems such as substance abuse or mental

health issue are often placed with grandparents or in foster care system. A key correlate of child abuse and neglect is poverty and economic distress. Many individuals'families experience financial crises because of inadequate savings, too much debt, and poor planning for potential major life events. Individuals and families often lack basic skills in financial decision making. These threats to financial security are of special concern for low to moderate income families, the working poor, minorities and women. Seventy-three percent of black children grow up in households with zero or negative financial assets. The working poor, rural workers and minorities are more likely to have no savings, lack adequate retirement income, and fall prey to fraudulent practices that cause them to lose the assets.

Housing generally represents the single largest expenditure for most families. Foreclosures are on the increase both across the nation and in North Carolina. Living expenses that are not a part of the mortgage or monthly rent are also substantial. On average, US homeowners (single family homes) spend almost $1,500 a year on energy costs. Housing safety is another concern. These hazards include building structural safety, electrical safety, fire safety, lead hazards, and indoor air quality issues such as mold, carbon monoxide, etc.

One of the most pressing social issues we face in North Carolina is how to provide our youth with a solid foundation for life. Persistently high rates of substance drug use, teenage pregnancy, violence, school failure, obesity among other issues call attention to the challenges and problems facing too many youth. The concept of positive youth development suggests that youth are capable of growing up properly and avoiding trouble if they are involved in social programs that discourage harmful behavior. Youth without these resources are generally overrepresented in statistics on crime, school failure, adolescent pregnancies, family violence, homelessness, and poverty. Efforts that promote positive individual and social assets can help overcome poor life conditions and ultimately aid in breaking the poverty cycle.

The need to address these problems is especially critical in communities with large portions of underserved populations. A substantial part of this population is located in the Black Belt counties of North Carolina. The Black Belt counties make up 15 of the 22 counties identified by the USDA's Economic Research Service as persistently poor and contain above average concentrations of African Americans. These underserved areas include a growing Hispanic presence as well.

2. Scope of the Program

- ☑ In-State Extension
- ☑ In-State Research
- ☐ Multistate Research
- ☑ Multistate Extension
- ☑ Integrated Research and Extension
- ☐ Multistate Integrated Research and Extension

V(D). Planned Program (Assumptions and Goals)

1. Assumptions made for the Program

1. Financial literacy can be achieved through community education efforts which in turn will lead to limited resources individuals and families improving their financial situations and their quality of life.
2. Through 4-H club, school enrichment, special interest, camping, K-12 programs, and resilient youth programming, young people can develop social competence, and achieve effective problem solving, autonomy and a sense of purpose and future.
3. A wide variety of learning and leading experiences can help youth and empower families to avoid risks, build assets, and prepare for meaningful adult roles in family, work, and civic on the continuously changing nature of the world of work.
4. Individuals and families seek to improve their personal, social and economic situations. Communities

can improve their infrastructure and economic situation through improved leadership and with research-based information to guide them.

2. Ultimate goal(s) of this Program

The ultimate goals of this program are 1) to assist families with obtaining financial literacy and other financial management skills that will enable them to provide for their children and to promote positive youth development for these children; 2) design, implement and evaluate programs targeting six Long Range Focus Areas: healthy eating; physical activity and chronic disease risk reduction; preparing youth for an employable future and economic success; building community through volunteerism; building citizen leaders; developing life skills and K-12 academic achievement and educational success; 3) increased use of positive parenting practices by parents and other caretakers to reduce or eliminate child abuse and neglect; 4) effective use of money management planning by families and individuals to reduce debt, increase saving for retirement and other short-term and long-term goals; 5) demonstration of essential skills of homeowners to help maintain and/or increase the value of their homes, and 6) establishment of an informed consumer group regarding how to create and maintain healthy, safe homes.

V(E). Planned Program (Inputs)

1. Estimated Number of professional FTE/SYs to be budgeted for this Program

Year	Extension		Research	
	1862	1890	1862	1890
2012	77.0	12.0	8.0	5.0
2013	77.0	12.0	8.0	5.0
2014	77.0	12.0	8.0	5.0
2015	77.0	12.0	8.0	5.0
2016	77.0	12.0	8.0	5.0

V(F). Planned Program (Activity)

1. Activity for the Program

The family-focused goals of this program will be addressed primarily through a series of workshops that focus on developing family resource management, investment in healthy housing practices, and effective parenting. The goals will be to teach consumers:

1. Family resource management, debt reduction, developing budgets and saving plans
2. To be inclusive of low to moderate income families and families headed by women
3. About reducing home hazards
4. Disseminate of research findings related to agencies/organizations serving limited resource families

Youth impact will be achieved by developing and testing an educational curriculum designed to help youth develop characteristics associated with positive youth development. This will be achieved through a collaborative process of teams of campus/field based youth development educators, 4-H and other community professionals and volunteers, and youth. Each team builds youth development professional practices and expands the impact of evaluations as they: 1) scan the environment and identify emerging

focus areas representing educational needs; 2) design and deliver programs responsive to those needs; and 3) design and implement outcome and impact evaluation tools to report successes into the Extension Reporting System. Along with the development of the these programs and its curricula, an additional focus will be to develop strategies to increase access to 4-H programs in local communities, with the intent to build strong networks of individuals who can address the unique needs of the targeted audience.

Contributions to community development will be achieved through a series of research activities including: (1) a study to determine the challenges of new manufactured home owners in the site installation of the units and develop recommendations to the industry for improving the installation process; (2) development of a database of community-based organizations (CBOs) by location, program priorities, capacity and method of operation to encourage collaboration among CBOs, policymakers, businesses and development agencies; and (3) a study to define the critical factors that impact leadership development in rural areas that could lead to new or improved programs for developing future leaders and contributing to the sustainability of rural communities.

2. Type(s) of methods to be used to reach direct and indirect contacts

Extension

Direct Methods	Indirect Methods
☑ Education Class	☑ Public Service Announcement
☑ Workshop	☐ Billboards
☑ Group Discussion	☑ Newsletters
☑ One-on-One Intervention	☑ TV Media Programs
☑ Demonstrations	☑ Web sites
☐ Other 1	☐ Other 1
☐ Other 2	☐ Other 2

3. Description of targeted audience

The target audience for the activities of this program includes individuals/family consumers, working poor, low to moderate income, minorities, women, homeowners, families with young children, limited resource parents, caregivers, court mandated or DSS referred parents, and grandparents raising grandchildren in North Carolina. Other audiences include youth, volunteers, stakeholders and youth development professionals "to create helping relationships, to enable youths to become responsible, productive citizens."

Stakeholders for this program include advocates of underserved populations, representatives of rural communities, policy makers, community based organizations, and the scientific community.

V(G). Planned Program (Outputs)

1. Standard output measures

Target for the number of persons(contacts) to be reached through direct and indirect contact

	Direct Contact Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Year	Target	Target	Target	Target
2012	67800	310000	260000	800000

	Direct Contact Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Year	Target	Target	Target	Target
2013	67800	321000	270000	850000
2014	67800	331000	280000	850000
2015	68800	331000	285000	860000
2016	68800	334000	285000	860000

2. (Standard Research Target) Number of Patent Applications Submitted

2012:0 **2013:**0 **2014:**0 **2015:**0 **2016:**0

3. Expected Peer Review Publications

Year	Research Target	Extension Target	Total
2012	3	21	24
2013	3	21	24
2014	3	21	24
2015	3	21	24
2016	3	21	24

V(H). State Defined Outputs

1. Output Target

- Develop and conduct Family Resource Management training and workshops.

  2012:20 **2013:**20 **2014:**20 **2015:**22 **2016:**22

- Educational workshops for consumers related to family resource management, debt reduction, developing budgets and savings plans.

  2012:25 **2013:**25 **2014:**25 **2015:**26 **2016:**26

- Conduct educational workshops for consumers related to parenting and family life.

  2012:65 **2013:**70 **2014:**70 **2015:**72 **2016:**72

- Conduct Healthy Homes training for health and housing professionals.

  2012:4 **2013:**4 **2014:**4 **2015:**3 **2016:**3

- Parents mandated by the court and agency referred parents consistently using positive parenting strategies.

  2012:230 **2013:**230 **2014:**230 **2015:**230 **2016:**230

- Develop and conduct financial education workshops for community based financial educators.

  2012:30 **2013:**30 **2014:**30 **2015:**25 **2016:**25

- Conduct educational workshops related to energy efficiency and conservation.

  2012:40 **2013:**40 **2014:**40 **2015:**42 **2016:**42

- Healthy Eating, Physical Activity and Chronic Disease Risk Reduction

  2012:18000 **2013:**18000 **2014:**18000 **2015:**19000 **2016:**19000

- Preparing Youth for an Employable Future and Economic Success

  2012:9500 **2013:**10000 **2014:**11000 **2015:**12000 **2016:**12000

- Building Community through Volunteerism

2012:15000 **2013:**15000 **2014:**15000 **2015:**15000 **2016:**15000

- Building Citizen Leaders

2012:12000 **2013:**13000 **2014:**14000 **2015:**15000 **2016:**15000

- Developing Life Skills

2012:20000 **2013:**20000 **2014:**20000 **2015:**20000 **2016:**21000

- K-12 Academic Achievement and Educational Success

2012:4000 **2013:**5000 **2014:**6000 **2015:**6500 **2016:**6500

- # presentations at professional meetings

2012:11 **2013:**12 **2014:**15 **2015:**15 **2016:**25

V(I). State Defined Outcome

O. No	Outcome Name
1	Parents adopting appropriate guidance/supervision practices
2	Individuals and families will follow a household budget
3	Individuals and families will increase savings
4	Individuals and families will reduce debt
5	Individuals/families will participate in retirement planning
6	Individuals, businesses, industries and governments engaging in best management practices related to energy use/conservation
7	Individuals participating in the Healthy Homes Specialist certification exam
8	Youth Involved: 4-H Clubs, School Enrichment, Special Interest and Resident/Day Camps Healthy eating, physical activity and chronic disease risk reduction
9	Youth Involved: 4-H Clubs, School Enrichment, Special Interest and Resident/Day Camps Preparing youth for an employable future and economic success
10	Youth Involved: 4-H Clubs, School Enrichment, Special Interest and Resident/Day Camps Building community through volunteerism
11	Youth Involved: 4-H Clubs, School Enrichment, Special Interest and Resident/Day Camps Building citizen leaders
12	Youth Involved: 4-H Clubs, School Enrichment, Special Interest and Resident/Day Camps Developing life skills

13	Youth Involved: 4-H Clubs, School Enrichment, Special Interest and Resident/Day Camps K-12 Academic Achievement and Educational Success
14	% improved leadership development in rural communities
15	Tax preparers gain needed knowledge for return preparation by attending workshops conducted throughout North Carolina
16	# organizations accessing and using database of community-based organizations
17	# policy makers using data to change policies affecting individuals, families and communities

Outcome # 1

1. Outcome Target

Parents adopting appropriate guidance/supervision practices

2. Outcome Type :

- (●) Change in Knowledge Outcome Measure
- ( ) Change in Action Outcome Measure
- ( ) Change in Condition Outcome Measure

2012:2000 **2013:**2000 **2014:**2000 **2015:**2100 **2016:**2100

3. Associated Knowledge Area(s)

- ☐ 607 - Consumer Economics
- ☐ 801 - Individual and Family Resource Management
- ☑ 802 - Human Development and Family Well-Being
- ☐ 803 - Sociological and Technological Change Affecting Individuals, Families, and Communities
- ☐ 804 - Human Environmental Issues Concerning Apparel, Textiles, and Residential and Commercial
- ☐ 805 - Community Institutions, Health, and Social Services
- ☐ 806 - Youth Development

4. Associated Institute Type(s)

- ☑ 1862 Extension
- ☐ 1862 Research
- ☑ 1890 Extension
- ☐ 1890 Research

Outcome # 2

1. Outcome Target

Individuals and families will follow a household budget

2. Outcome Type :

- (●) Change in Knowledge Outcome Measure
- ( ) Change in Action Outcome Measure
- ( ) Change in Condition Outcome Measure

2012:1500 **2013:**1500 **2014:**1500 **2015:**1600 **2016:**1600

3. Associated Knowledge Area(s)

- ☐ 607 - Consumer Economics
- ☐ 801 - Individual and Family Resource Management
- ☑ 802 - Human Development and Family Well-Being
- ☐ 803 - Sociological and Technological Change Affecting Individuals, Families, and Communities
- ☑ 804 - Human Environmental Issues Concerning Apparel, Textiles, and Residential and Commercial
- ☐ 805 - Community Institutions, Health, and Social Services
- ☐ 806 - Youth Development

4. Associated Institute Type(s)

- ☑ 1862 Extension
- ☐ 1862 Research
- ☑ 1890 Extension
- ☐ 1890 Research

Outcome # 3

1. Outcome Target

Individuals and families will increase savings

2. Outcome Type :

- (●) Change in Knowledge Outcome Measure
- ( ) Change in Action Outcome Measure
- ( ) Change in Condition Outcome Measure

2012:1100 **2013:**1100 **2014:**1100 **2015:**1200 **2016:**1200

3. Associated Knowledge Area(s)

- ☐ 607 - Consumer Economics
- ☑ 801 - Individual and Family Resource Management
- ☑ 802 - Human Development and Family Well-Being
- ☐ 803 - Sociological and Technological Change Affecting Individuals, Families, and Communities

- ☐ 804 - Human Environmental Issues Concerning Apparel, Textiles, and Residential and Commercial
- ☐ 805 - Community Institutions, Health, and Social Services
- ☐ 806 - Youth Development

4. Associated Institute Type(s)

- ☑ 1862 Extension
- ☐ 1862 Research
- ☑ 1890 Extension
- ☐ 1890 Research

Outcome # 4

1. Outcome Target

Individuals and families will reduce debt

2. Outcome Type :

- ◉ Change in Knowledge Outcome Measure
- ◯ Change in Action Outcome Measure
- ◯ Change in Condition Outcome Measure

2012:300 **2013:**300 **2014:**300 **2015:**300 **2016:**300

3. Associated Knowledge Area(s)

- ☐ 607 - Consumer Economics
- ☑ 801 - Individual and Family Resource Management
- ☑ 802 - Human Development and Family Well-Being
- ☐ 803 - Sociological and Technological Change Affecting Individuals, Families, and Communities
- ☐ 804 - Human Environmental Issues Concerning Apparel, Textiles, and Residential and Commercial
- ☐ 805 - Community Institutions, Health, and Social Services
- ☐ 806 - Youth Development

4. Associated Institute Type(s)

- ☑ 1862 Extension
- ☐ 1862 Research
- ☑ 1890 Extension
- ☐ 1890 Research

Outcome # 5

1. Outcome Target

Individuals/families will participate in retirement planning

2. Outcome Type :

- (●) Change in Knowledge Outcome Measure
- ( ) Change in Action Outcome Measure
- ( ) Change in Condition Outcome Measure

2012:800 **2013:**800 **2014:**800 **2015:**950 **2016:**950

3. Associated Knowledge Area(s)

- ☐ 607 - Consumer Economics
- ☑ 801 - Individual and Family Resource Management
- ☑ 802 - Human Development and Family Well-Being
- ☐ 803 - Sociological and Technological Change Affecting Individuals, Families, and Communities
- ☑ 804 - Human Environmental Issues Concerning Apparel, Textiles, and Residential and Commercial
- ☐ 805 - Community Institutions, Health, and Social Services
- ☐ 806 - Youth Development

4. Associated Institute Type(s)

- ☑ 1862 Extension
- ☐ 1862 Research
- ☑ 1890 Extension
- ☐ 1890 Research

Outcome # 6

1. Outcome Target

Individuals, businesses, industries and governments engaging in best management practices related to energy use/conservation

2. Outcome Type :

- (●) Change in Knowledge Outcome Measure
- ( ) Change in Action Outcome Measure
- ( ) Change in Condition Outcome Measure

2012:2500 **2013:**2500 **2014:**2500 **2015:**2500 **2016:**2500

3. Associated Knowledge Area(s)

- ☐ 607 - Consumer Economics
- ☐ 801 - Individual and Family Resource Management
- ☑ 802 - Human Development and Family Well-Being
- ☐ 803 - Sociological and Technological Change Affecting Individuals, Families, and Communities
- ☑ 804 - Human Environmental Issues Concerning Apparel, Textiles, and Residential and Commercial
- ☐ 805 - Community Institutions, Health, and Social Services
- ☐ 806 - Youth Development

4. Associated Institute Type(s)

- ☑ 1862 Extension
- ☐ 1862 Research
- ☑ 1890 Extension
- ☐ 1890 Research

Outcome # 7

1. Outcome Target

Individuals participating in the Healthy Homes Specialist certification exam

2. Outcome Type :

- ○ Change in Knowledge Outcome Measure
- ◉ Change in Action Outcome Measure
- ○ Change in Condition Outcome Measure

2012:30 **2013:**30 **2014:**30 **2015:**30 **2016:**30

3. Associated Knowledge Area(s)

- ☐ 607 - Consumer Economics
- ☐ 801 - Individual and Family Resource Management
- ☐ 802 - Human Development and Family Well-Being
- ☐ 803 - Sociological and Technological Change Affecting Individuals, Families, and Communities
- ☑ 804 - Human Environmental Issues Concerning Apparel, Textiles, and Residential and Commercial
- ☐ 805 - Community Institutions, Health, and Social Services
- ☐ 806 - Youth Development

4. Associated Institute Type(s)

- ☑ 1862 Extension
- ☐ 1862 Research
- ☑ 1890 Extension

☐ 1890 Research

Outcome # 8

1. Outcome Target

Youth Involved: 4-H Clubs, School Enrichment, Special Interest and Resident/Day Camps Healthy eating, physical activity and chronic disease risk reduction

2. Outcome Type :

○ Change in Knowledge Outcome Measure
◉ Change in Action Outcome Measure
○ Change in Condition Outcome Measure

2012:18000 **2013:**18000 **2014:**18000 **2015:**18000 **2016:**18000

3. Associated Knowledge Area(s)

☐ 607 - Consumer Economics
☐ 801 - Individual and Family Resource Management
☐ 802 - Human Development and Family Well-Being
☐ 803 - Sociological and Technological Change Affecting Individuals, Families, and Communities
☐ 804 - Human Environmental Issues Concerning Apparel, Textiles, and Residential and Commercial
☐ 805 - Community Institutions, Health, and Social Services
☑ 806 - Youth Development

4. Associated Institute Type(s)

☑ 1862 Extension
☐ 1862 Research
☑ 1890 Extension
☐ 1890 Research

Outcome # 9

1. Outcome Target

Youth Involved: 4-H Clubs, School Enrichment, Special Interest and Resident/Day Camps Preparing youth for an employable future and economic success

2. Outcome Type :

○ Change in Knowledge Outcome Measure
◉ Change in Action Outcome Measure
○ Change in Condition Outcome Measure

2012:9500 **2013:**10000 **2014:**11000 **2015:**11500 **2016:**11500

3. Associated Knowledge Area(s)

- ☐ 607 - Consumer Economics
- ☐ 801 - Individual and Family Resource Management
- ☐ 802 - Human Development and Family Well-Being
- ☐ 803 - Sociological and Technological Change Affecting Individuals, Families, and Communities
- ☐ 804 - Human Environmental Issues Concerning Apparel, Textiles, and Residential and Commercial
- ☐ 805 - Community Institutions, Health, and Social Services
- ☑ 806 - Youth Development

4. Associated Institute Type(s)

- ☑ 1862 Extension
- ☐ 1862 Research
- ☑ 1890 Extension
- ☐ 1890 Research

Outcome # 10

1. Outcome Target

Youth Involved: 4-H Clubs, School Enrichment, Special Interest and Resident/Day Camps Building community through volunteerism

2. Outcome Type :

- ○ Change in Knowledge Outcome Measure
- ◉ Change in Action Outcome Measure
- ○ Change in Condition Outcome Measure

2012:15000 **2013:**15000 **2014:**15000 **2015:**15500 **2016:**15500

3. Associated Knowledge Area(s)

- ☐ 607 - Consumer Economics
- ☐ 801 - Individual and Family Resource Management
- ☐ 802 - Human Development and Family Well-Being
- ☐ 803 - Sociological and Technological Change Affecting Individuals, Families, and Communities
- ☐ 804 - Human Environmental Issues Concerning Apparel, Textiles, and Residential and Commercial
- ☐ 805 - Community Institutions, Health, and Social Services
- ☑ 806 - Youth Development

4. Associated Institute Type(s)

- [x] 1862 Extension
- [ ] 1862 Research
- [x] 1890 Extension
- [ ] 1890 Research

Outcome # 11

1. Outcome Target

Youth Involved: 4-H Clubs, School Enrichment, Special Interest and Resident/Day Camps Building citizen leaders

2. Outcome Type :

- ( ) Change in Knowledge Outcome Measure
- (•) Change in Action Outcome Measure
- ( ) Change in Condition Outcome Measure

2012:12000	**2013:**13000	**2014:**14000	**2015:**14500	**2016:**14500

3. Associated Knowledge Area(s)

- [ ] 607 - Consumer Economics
- [ ] 801 - Individual and Family Resource Management
- [ ] 802 - Human Development and Family Well-Being
- [ ] 803 - Sociological and Technological Change Affecting Individuals, Families, and Communities
- [ ] 804 - Human Environmental Issues Concerning Apparel, Textiles, and Residential and Commercial
- [ ] 805 - Community Institutions, Health, and Social Services
- [x] 806 - Youth Development

4. Associated Institute Type(s)

- [x] 1862 Extension
- [ ] 1862 Research
- [x] 1890 Extension
- [ ] 1890 Research

Outcome # 12

1. Outcome Target

Youth Involved: 4-H Clubs, School Enrichment, Special Interest and Resident/Day Camps Developing life skills

2. Outcome Type :

- ○ Change in Knowledge Outcome Measure
- ◉ Change in Action Outcome Measure
- ○ Change in Condition Outcome Measure

2012:20000 **2013:**20000 **2014:**20000 **2015:**20500 **2016:**20500

3. Associated Knowledge Area(s)

- ☐ 607 - Consumer Economics
- ☐ 801 - Individual and Family Resource Management
- ☐ 802 - Human Development and Family Well-Being
- ☐ 803 - Sociological and Technological Change Affecting Individuals, Families, and Communities
- ☐ 804 - Human Environmental Issues Concerning Apparel, Textiles, and Residential and Commercial
- ☐ 805 - Community Institutions, Health, and Social Services
- ☑ 806 - Youth Development

4. Associated Institute Type(s)

- ☑ 1862 Extension
- ☐ 1862 Research
- ☑ 1890 Extension
- ☐ 1890 Research

Outcome # 13

1. Outcome Target

Youth Involved: 4-H Clubs, School Enrichment, Special Interest and Resident/Day Camps K-12 Academic Achievement and Educational Success

2. Outcome Type :

- ◉ Change in Knowledge Outcome Measure
- ○ Change in Action Outcome Measure
- ○ Change in Condition Outcome Measure

2012:4000 **2013:**5000 **2014:**6000 **2015:**6500 **2016:**6500

3. Associated Knowledge Area(s)

- ☐ 607 - Consumer Economics
- ☐ 801 - Individual and Family Resource Management
- ☐ 802 - Human Development and Family Well-Being
- ☐ 803 - Sociological and Technological Change Affecting Individuals, Families, and Communities

- ☐ 804 - Human Environmental Issues Concerning Apparel, Textiles, and Residential and Commercial
- ☐ 805 - Community Institutions, Health, and Social Services
- ☑ 806 - Youth Development

4. Associated Institute Type(s)

- ☑ 1862 Extension
- ☐ 1862 Research
- ☑ 1890 Extension
- ☐ 1890 Research

Outcome # 14

1. Outcome Target

% improved leadership development in rural communities

2. Outcome Type :

- ◉ Change in Knowledge Outcome Measure
- ◯ Change in Action Outcome Measure
- ◯ Change in Condition Outcome Measure

2012:40 **2013:**50 **2014:**55 **2015:**55 **2016:**55

3. Associated Knowledge Area(s)

- ☐ 607 - Consumer Economics
- ☐ 801 - Individual and Family Resource Management
- ☐ 802 - Human Development and Family Well-Being
- ☑ 803 - Sociological and Technological Change Affecting Individuals, Families, and Communities
- ☐ 804 - Human Environmental Issues Concerning Apparel, Textiles, and Residential and Commercial
- ☑ 805 - Community Institutions, Health, and Social Services
- ☐ 806 - Youth Development

4. Associated Institute Type(s)

- ☑ 1862 Extension
- ☐ 1862 Research
- ☑ 1890 Extension
- ☑ 1890 Research

Outcome # 15

1. Outcome Target

Tax preparers gain needed knowledge for return preparation by attending workshops conducted throughout North Carolina

2. Outcome Type :

- (●) Change in Knowledge Outcome Measure
- ( ) Change in Action Outcome Measure
- ( ) Change in Condition Outcome Measure

2012:500 **2013:**500 **2014:**500 **2015:**500 **2016:**500

3. Associated Knowledge Area(s)

- ☑ 607 - Consumer Economics
- ☑ 801 - Individual and Family Resource Management
- ☐ 802 - Human Development and Family Well-Being
- ☑ 803 - Sociological and Technological Change Affecting Individuals, Families, and Communities
- ☐ 804 - Human Environmental Issues Concerning Apparel, Textiles, and Residential and Commercial
- ☐ 805 - Community Institutions, Health, and Social Services
- ☐ 806 - Youth Development

4. Associated Institute Type(s)

- ☑ 1862 Extension
- ☐ 1862 Research
- ☑ 1890 Extension
- ☐ 1890 Research

Outcome # 16

1. Outcome Target

organizations accessing and using database of community-based organizations

2. Outcome Type :

- (●) Change in Knowledge Outcome Measure
- ( ) Change in Action Outcome Measure
- ( ) Change in Condition Outcome Measure

2012:300 **2013:**300 **2014:**300 **2015:**300 **2016:**300

3. Associated Knowledge Area(s)

- ☐ 607 - Consumer Economics
- ☐ 801 - Individual and Family Resource Management
- ☐ 802 - Human Development and Family Well-Being
- ☑ 803 - Sociological and Technological Change Affecting Individuals, Families, and Communities
- ☐ 804 - Human Environmental Issues Concerning Apparel, Textiles, and Residential and Commercial
- ☐ 805 - Community Institutions, Health, and Social Services
- ☐ 806 - Youth Development

4. Associated Institute Type(s)

- ☑ 1862 Extension
- ☑ 1862 Research
- ☑ 1890 Extension
- ☑ 1890 Research

Outcome # 17

1. Outcome Target

policy makers using data to change policies affecting individuals, families and communities

2. Outcome Type :

- ◉ Change in Knowledge Outcome Measure
- ◯ Change in Action Outcome Measure
- ◯ Change in Condition Outcome Measure

2012:8	**2013:**9	**2014:**9	**2015:**9	**2016:**9

3. Associated Knowledge Area(s)

- ☐ 607 - Consumer Economics
- ☐ 801 - Individual and Family Resource Management
- ☑ 802 - Human Development and Family Well-Being
- ☑ 803 - Sociological and Technological Change Affecting Individuals, Families, and Communities
- ☑ 804 - Human Environmental Issues Concerning Apparel, Textiles, and Residential and Commercial
- ☑ 805 - Community Institutions, Health, and Social Services
- ☐ 806 - Youth Development

4. Associated Institute Type(s)

- ☑ 1862 Extension
- ☑ 1862 Research
- ☑ 1890 Extension

☑ 1890 Research

V(J). Planned Program (External Factors)

1. External Factors which may affect Outcomes

☑ Natural Disasters (drought, weather extremes, etc.)
☑ Economy
☑ Appropriations changes
☑ Public Policy changes
☑ Government Regulations
☐ Competing Public priorities
☑ Competing Programmatic Challenges
☑ Populations changes (immigration, new cultural groupings, etc.)
☐ Other

Description

The following are circumstances and events that might affect the goal, implementation or achievement of the program.

- Reductions in budget support for the program
- Reductions in State and County staff that develop and implement local programs
- Changes in public policy or mandates that conflict or redirect the application of program resources
- Availability of community partners (particularly with youth programming)
- Substantive increases in minority ethnic populations producing greater demand than available resources can address
- Limitations to accessing study populations and agreement of potential respondents to participate
- Natural disasters the impact extension's ability to deliver programs (due to budget and travel restrictions)
- These programs strive to accomplish program impacts in the context of well planned programs. Every effort is made to avoid reduced impacts due to funding and related staffing priority changes. On those occasions when funding and/or staffing priorities of collaborating partners shift, every effort is made to replace lost resources to minimize any lost program impacts.

V(K). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

☑ After Only (post program)
☐ Retrospective (post program)
☑ Before-After (before and after program)
☑ During (during program)
☑ Time series (multiple points before and after program)
☑ Case Study

- ☑ Comparisons between program participants (individuals, group, organizations) and non-participants
- ☐ Comparisons between different groups of individuals or program participants experiencing different levels of program intensity.
- ☐ Comparison between locales where the program operates and sites without program intervention
- ☑ Other (data provided by collaborators)

Description

Extension educators will conduct evaluation to determine the impact of educational programs. The educational program, funding requirements and learning objectives for the program will determine the type of evaluation study conducted. County agents will also collect success stories that will serve as case study examples of program impact.

Programs also will be evaluated for impact by objective/goal in the context of the Long Range Focus Area Team plan. These impacts will be reported in three separate, related systems; Extension Service 237, the North Carolina Extension Reporting System, and the knowledge, attitude, skill, and aspiration assessments for individual programs by teams.

Evaluation studies will be completed annually.

2. Data Collection Methods

- ☑ Sampling
- ☐ Whole population

Survey (Mail, Telephone, On-Site).

- ☑ Mail
- ☑ Telephone
- ☑ On-Site

Interview

- ☑ Structured
- ☐ Unstructured

- ☑ Case Study
- ☑ Observation
- ☐ Portfolio Reviews
- ☑ Tests
- ☐ Journals
- ☐ Other

Description

Extension educators will use a variety of methods to collect data. The target group for evaluation, type of program, information to be gathered and available funding will determined the specific method used for evaluation. Evaluation methods will include (but not limited to) whole population sampling, on-site surveys, and mail and telephone surveys. County agents will collect success stories to serve as case study examples of program impact.

The program teams will identify and collect data consistent with stated measures of progress and impact indicators or each identified sub-program. Data collection will include both qualitative to quantitative measures to provide a strong base of information for determining program impact and success. Data collection measures and collection methodology will follow strict protocols to ensure reliability and validity. Data collection measures will be determined based on the targeted outcomes of a

given activity or program aspect.

V(A). Planned Program (Summary)

Program # 8

1. Name of the Planned Program

Human Health, Nutrition and Well-being

2. Brief summary about Planned Program

Integrated research in metabolomics, biochemistry, pharmacogenomics, breeding and postharvest attributes will lead to development of mainstream fruits and vegetables with enhanced health benefits, and introduction of new or underappreciated crops and products. This will allow consumers to make proactive, responsible dietary choices that benefit their own and their families' health. One of their first major accomplishments, collaborating with the David H. Murdock Research Institute and a nationwide consortium, is the sequencing of the blueberry genome, a major fruit when fresh fruit consumption and antioxidants for health are considered. Additional cross-discipline research in genetics and genomic sciences, biochemistry, toxicology, biology and bioinformatics using a variety of organisms as models will yield responses and approaches to improve the health, nutrition and well-being of humans and their environment through dietary improvements, reduced susceptibility to diseases and new disease prevention technologies, and enhanced effectiveness of plant derived components. Some of these efforts include the following:

- ways to control the carriers of important human diseases that are borne by insect vectors that are pervasive in human environments;
- outreach and educational programs aimed at improving diets and related behaviors (such as exercise) to reduce prevalence of heart diseases, strokes and some cancers;
- genetic by environmental interactions that impact human health;
- examining the molecular basis of the cellular effects of antibiotic and probiotic compounds and to develop potential new materials;
- understanding genome-wide historical inferences of mutation, recombination and inbreeding in the genomes of disease-causing organisms responsible for causing malaria and Listeria, a food-borne disease agent;
- exploring potential roles of biofilms associated with bacterial masses, including the possibility of inactivating biofilms associated with disease causing organisms in both plants and animals, making them susceptible to existing or new antibiotics or other antibacterial compounds

Outreach with partner and interested life sciences communities, the food and pharmaceutical industries and peer scientific communities provides new technologies and scientific information, potential startup or existing manufacturing companies and local growers and producers of food and related raw and processed products. Finally, high level computational methods in the field of bioinformatics are used with very large and complex data sets to deliver predictive disease models and help scientists understand complex traits such as those underlying complex biological systems, including behavior.

3. Program existence :

- ○ New (One year or less)
- ◉ Intermediate (One to five years)
- ○ Mature (More than five years)

4. Program duration :

- ○ Short-Term(One year or less)
- ○ Medium-Term (One to five years)
- ◉ Long-Term (More than five years)

5. Expending formula funds or state-matching funds :

- ◉ Yes
- ○ No

6. Expending other than formula funds or state-matching funds :

- ◉ Yes
- ○ No

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
202	Plant Genetic Resources	5%	0%	15%	25%
206	Basic Plant Biology	5%	0%	15%	0%
502	New and Improved Food Products	10%	10%	15%	25%
701	Nutrient Composition of Food	10%	10%	10%	25%
702	Requirements and Function of Nutrients and Other Food Components	10%	10%	10%	25%
703	Nutrition Education and Behavior	15%	20%	0%	0%
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins	10%	15%	5%	0%
721	Insects and Other Pests Affecting Humans	10%	5%	10%	0%
722	Zoonotic Diseases and Parasites Affecting Humans	5%	5%	10%	0%
724	Healthy Lifestyle	10%	15%	10%	0%
802	Human Development and Family Well-Being	10%	10%	0%	0%
	Total	100%	100%	100%	100%

V(C). Planned Program (Situation and Scope)

1. Situation and priorities

Human health, disease and well-being are greatly influenced by the food we consume and the environment in which we live. Overweight and related health concerns (heart disease, atherosclerosis, high blood pressure, stroke and some cancers) have increased significantly in the past few decades and are influenced by the types and amounts of foods we consume and the amount of vigorous activity in which we engaged. Other diseases and disorders are caused or influenced by insect vectors that inhabit human environments; toxicants or contaminants in our food, air, or water we consume; genetic background that may be influenced by environmental factors; disease-causing organisms that are resistant to existing antibiotics or other treatment agents, as well as many other factors humans encounter daily. As scientists, regulators, manufacturers, marketers, educators, health care providers, and consumers seek solutions to these conditions that often shorten lives or at least reduce human well-being and quality of life, new fields of research exploration, instrumentation and in fact, research disciplines have formed and are functioning to understand complex biological systems and discover useful solutions. And ultimately, education, training and outreach will provide these solutions to a variety of users who will benefit by living healthier lives and by living longer.

2. Scope of the Program

- ☑ In-State Extension
- ☑ In-State Research
- ☐ Multistate Research
- ☑ Multistate Extension
- ☑ Integrated Research and Extension
- ☑ Multistate Integrated Research and Extension

V(D). Planned Program (Assumptions and Goals)

1. Assumptions made for the Program

- Continued state, federal, local and grant funding for basic and applied research, demonstration and outreach.
- Continued involvement in integrated, collaborative research with other institutional and industry partners.
- Continued involvement of programs such as NC Market Ready and other avenues to transfer information to a variety of users.

2. Ultimate goal(s) of this Program

North Carolinians will live long, healthy, disease-free lives emanating from healthy consumption of foods that are nutritious and safe - especially fruits and vegetables. Disease and sickness prevention and treatment strategies will benefit from research aimed to identify food components, effective antibiotics or other compounds that can prevent or treat diseases that impact humans.

V(E). Planned Program (Inputs)

1. Estimated Number of professional FTE/SYs to be budgeted for this Program

Year	Extension		Research	
	1862	1890	1862	1890

Year	Extension		Research	
	1862	1890	1862	1890
2012	10.0	4.0	50.0	6.0
2013	10.0	4.0	50.0	6.0
2014	10.0	4.0	50.0	6.0
2015	10.0	4.0	50.0	6.0
2016	10.0	4.0	50.0	6.0

V(F). Planned Program (Activity)

1. Activity for the Program

Human nutrition, health and well-being research and outreach programs will include, but not be limited to, the concepts listed below:

The Plants for Human Health Institute at Kannapolis, NC aims to enhance the nutritional value of fruits and vegetables and related compounds to improve human health and prevent disease. One of their first major accomplishments, collaborating with the David H. Murdock Research Institute and a nationwide consortium, is the sequencing of the blueberry genome, a major fruit when fresh fruit consumption and antioxidants for health are considered. Associated with the Institute, the NC Market Ready outreach program will provide information to growers and marketers for business management, marketing, safety and production management to facilitate the introduction and production of new crops evolving from the Institute's research efforts. Studies examine ways to identify and control tick species that vector Rocky Mountain Spotted Fever. A novel approach involved an all-natural botanical insect repellant for both ticks and mosquitoes. Biochemical research is developing technologies to produce effective vaccines against insect vectored diseases. Biochemists are seeking to understand ribosomal RNA targets for antibiotics in an effort to understand why antibiotics lose their effectiveness, ways to enhance the effectiveness of existing materials and possibly find new antibiotics with enhanced effectiveness or new modes of action. Also researchers are looking at the various potential uses of biofilms associated with bacterial masses, including the possibility of inactivating biofilms associated with disease causing organisms, making them susceptible to existing or new antibiotics or other antibacterial compounds. Geneticists are seeking to understand relationships between genetic makeups of animals and based on that, how environmental influences (chemicals, toxicants, food compounds) might influence cancer development. Outreach with partner and interested life sciences communities, the food and pharmaceutical industries and peer scientific communities provides new technologies and scientific information which may become the basis of startup or existing manufacturing companies.

2. Type(s) of methods to be used to reach direct and indirect contacts

Extension

Direct Methods	Indirect Methods

☑ Education Class	☐ Public Service Announcement
☑ Workshop	☐ Billboards
☐ Group Discussion	☑ Newsletters
☑ One-on-One Intervention	☑ TV Media Programs
☑ Demonstrations	☑ Web sites
☐ Other 1	☑ Other 1 (Social Media)
☐ Other 2	☐ Other 2

3. Description of targeted audience

Peer researchers and collaborators, including health care providers
Food processors and manufacturers
Farmers and growers
Consumers
Allied technical service providers and consultants to growers, processors and marketers

V(G). Planned Program (Outputs)

1. Standard output measures

Target for the number of persons(contacts) to be reached through direct and indirect contact

	Direct Contact Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Year	Target	Target	Target	Target
2012	2500	5000	500	2500
2013	2500	5000	500	2500
2014	2500	5000	500	2500
2015	2500	5000	500	2500
2016	2500	5000	500	2500

2. (Standard Research Target) Number of Patent Applications Submitted

2012:5 **2013:**5 **2014:**5 **2015:**5 **2016:**5

3. Expected Peer Review Publications

Year	Research Target	Extension Target	Total
2012	55	25	80
2013	55	25	80
2014	55	25	80
2015	65	30	95

Year	Research Target	Extension Target	Total
2016	65	30	95

V(H). State Defined Outputs

1. Output Target

- Non-degree credit group activities conducted related to human health, nutrition and well-being

  2012:50 **2013:**50 **2014:**50 **2015:**50 **2016:**50

- Targeted audiences participate in workshops and demonstrations on human health, nutrition and well-being

  2012:2500 **2013:**2500 **2014:**2500 **2015:**2500 **2016:**2500

- Conduct research projects related to human health, nutrition and well-being

  2012:100 **2013:**100 **2014:**100 **2015:**100 **2016:**100

V(I). State Defined Outcome

O. No	Outcome Name
1	Identify and develop new food constituents or compounds that can benefit human health or nutrition
2	Create new plant materials (germ plasm, breeding lines, cultivars) that contain health benefiting compounds
3	Research projects generate findings that impact the knowledge of and control of vectors that impact human health and safety
4	Research projects generate findings that impact the knowledge of prevention or curing of diseases influenced by interactions of genetics and the environment

Outcome # 1

1. Outcome Target

Identify and develop new food constituents or compounds that can benefit human health or nutrition

2. Outcome Type :

- ○ Change in Knowledge Outcome Measure
- ○ Change in Action Outcome Measure
- ◉ Change in Condition Outcome Measure

2012:4 **2013:**4 **2014:**4 **2015:**4 **2016:**4

3. Associated Knowledge Area(s)

- ☐ 202 - Plant Genetic Resources
- ☑ 206 - Basic Plant Biology
- ☑ 502 - New and Improved Food Products
- ☑ 701 - Nutrient Composition of Food
- ☐ 702 - Requirements and Function of Nutrients and Other Food Components
- ☐ 703 - Nutrition Education and Behavior
- ☐ 712 - Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally
- ☐ 721 - Insects and Other Pests Affecting Humans
- ☐ 722 - Zoonotic Diseases and Parasites Affecting Humans
- ☑ 724 - Healthy Lifestyle
- ☐ 802 - Human Development and Family Well-Being

4. Associated Institute Type(s)

- ☐ 1862 Extension
- ☑ 1862 Research
- ☐ 1890 Extension
- ☑ 1890 Research

Outcome # 2

1. Outcome Target

Create new plant materials (germ plasm, breeding lines, cultivars) that contain health benefiting compounds

2. Outcome Type :

- ○ Change in Knowledge Outcome Measure
- ○ Change in Action Outcome Measure
- ◉ Change in Condition Outcome Measure

2012:2 **2013:**2 **2014:**2 **2015:**2 **2016:**2

3. Associated Knowledge Area(s)

- ☑ 202 - Plant Genetic Resources
- ☑ 206 - Basic Plant Biology
- ☑ 502 - New and Improved Food Products
- ☐ 701 - Nutrient Composition of Food
- ☐ 702 - Requirements and Function of Nutrients and Other Food Components
- ☐ 703 - Nutrition Education and Behavior
- ☐ 712 - Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally
- ☐ 721 - Insects and Other Pests Affecting Humans
- ☐ 722 - Zoonotic Diseases and Parasites Affecting Humans
- ☐ 724 - Healthy Lifestyle
- ☐ 802 - Human Development and Family Well-Being

4. Associated Institute Type(s)

- ☐ 1862 Extension
- ☑ 1862 Research
- ☐ 1890 Extension
- ☐ 1890 Research

Outcome # 3

1. Outcome Target

Research projects generate findings that impact the knowledge of and control of vectors that impact human health and safety

2. Outcome Type :

- ◉ Change in Knowledge Outcome Measure
- ○ Change in Action Outcome Measure
- ○ Change in Condition Outcome Measure

2012:5 **2013:**5 **2014:**5 **2015:**5 **2016:**5

3. Associated Knowledge Area(s)

- ☐ 202 - Plant Genetic Resources
- ☐ 206 - Basic Plant Biology
- ☐ 502 - New and Improved Food Products
- ☐ 701 - Nutrient Composition of Food
- ☐ 702 - Requirements and Function of Nutrients and Other Food Components
- ☐ 703 - Nutrition Education and Behavior
- ☐ 712 - Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally
- ☑ 721 - Insects and Other Pests Affecting Humans
- ☑ 722 - Zoonotic Diseases and Parasites Affecting Humans
- ☐ 724 - Healthy Lifestyle
- ☐ 802 - Human Development and Family Well-Being

4. Associated Institute Type(s)

- ☑ 1862 Extension
- ☑ 1862 Research
- ☐ 1890 Extension
- ☑ 1890 Research

Outcome # 4

1. Outcome Target

Research projects generate findings that impact the knowledge of prevention or curing of diseases influenced by interactions of genetics and the environment

2. Outcome Type :

- ◉ Change in Knowledge Outcome Measure
- ◯ Change in Action Outcome Measure
- ◯ Change in Condition Outcome Measure

2012:50 **2013:**50 **2014:**50 **2015:**50 **2016:**50

3. Associated Knowledge Area(s)

- ☐ 202 - Plant Genetic Resources
- ☐ 206 - Basic Plant Biology
- ☐ 502 - New and Improved Food Products
- ☐ 701 - Nutrient Composition of Food
- ☐ 702 - Requirements and Function of Nutrients and Other Food Components
- ☐ 703 - Nutrition Education and Behavior
- ☐ 712 - Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally
- ☐ 721 - Insects and Other Pests Affecting Humans
- ☑ 722 - Zoonotic Diseases and Parasites Affecting Humans

- ☑ 724 - Healthy Lifestyle
- ☐ 802 - Human Development and Family Well-Being

4. Associated Institute Type(s)

- ☐ 1862 Extension
- ☑ 1862 Research
- ☐ 1890 Extension
- ☑ 1890 Research

V(J). Planned Program (External Factors)

1. External Factors which may affect Outcomes

- ☑ Natural Disasters (drought, weather extremes, etc.)
- ☑ Economy
- ☑ Appropriations changes
- ☑ Public Policy changes
- ☑ Government Regulations
- ☑ Competing Public priorities
- ☑ Competing Programmatic Challenges
- ☑ Populations changes (immigration, new cultural groupings, etc.)
- ☐ Other

Description

Possible reductions in financial support, reductions in research and support staff, natural disasters, changes in public policy or funding priorities and availability of external grants and partner collaborations could negatively impact the program. New faculty hires occurring near the beginning of this POW will help enhance the productivity and output of these programs.

V(K). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

- ☐ After Only (post program)
- ☐ Retrospective (post program)
- ☐ Before-After (before and after program)
- ☐ During (during program)
- ☐ Time series (multiple points before and after program)
- ☐ Case Study
- ☐ Comparisons between program participants (individuals, group, organizations) and non-participants

- ☐ Comparisons between different groups of individuals or program participants experiencing different levels of program intensity.
- ☐ Comparison between locales where the program operates and sites without program intervention
- ☐ Other

Description

Peer reviews of Hatch projects and journal article manuscripts; panel reviews of grant proposals

2. Data Collection Methods

- ☐ Sampling
- ☐ Whole population

Survey (Mail, Telephone, On-Site).

- ☐ Mail
- ☐ Telephone
- ☐ On-Site

Interview

- ☐ Structured
- ☐ Unstructured

- ☐ Case Study
- ☐ Observation
- ☐ Portfolio Reviews
- ☐ Tests
- ☐ Journals
- ☐ Other

Description