FY 2005
Annual Report of Accomplishments and Results

Partnerships Unit
Cooperative State Research, Education, and Extension Service
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Submitted by

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AGRICULTURAL RESEARCH PROGRAM

I. PLANNED PROGRAMS

A. *Goal 1: An agricultural system that is highly competitive in the global economy*

1. Overview

Agricultural research at North Carolina A&T State University (NCA&TSU) is directed toward three objectives: (a) increasing production and added value of North Carolina farm products, (b) increasing competitiveness and profitability by increasing international markets for NC products, and (c) assisting small tobacco farmers in shifting to alternative crop and animal production. Highlights of the 2004-2005 fiscal year are listed and specific accomplishments/impacts are reported under the Key Theme sections below.

Highlights:

- The growing demand for lactic acid as a resource for the production of biodegradable polylactic acid (PLA) has created an economic opportunity for the use of cheese whey. NCA&TSU agricultural scientists have developed a process for fermenting cheese whey, a major agricultural by-product, to produce lactic acid. Publication of the details of the process is currently being prepared.

- A group consisting of the Dean of the School of Agriculture and Environmental Sciences, agricultural scientists, and researchers representing NCA&TSU's International Trade Center visited China with the purpose of making contacts for developing an export market for pork parts to China. These parts of the hog are usually discarded in the U.S. and include the kidney, tongue, intestine, nose, whole feet, and liver. The visit established a business arrangement that is likely to add a value of $5.00 per head for U.S. hogs. As a result of this visit, North Carolina hog farmers expect a substantial increase in export of pork products to China and demand for pork products from North Carolina.

Total Expenditures: Section 1445 and State Matching Funds = $2,151,726

FTE's: 6.1

1. *Key Theme – Small Farm Viability*

Description:

Small farm viability faces many challenges in North Carolina. Historic legislation passed by the U.S. Congress last year ended the 70-year old tobacco program. The significant

decline of tobacco as a major crop is forcing many small farmers to turn to alternative crops and animal production as a means for being able to continue in the farming business. Experts think the tobacco buyout may reduce the number of tobacco farmers in North Carolina by 75 percent. To assist with this transition, researchers have combined efforts with Extension personnel to identify, test, and demonstrate viable alternatives. Success in moving small farmers into specialty pork and mushroom production is reported in this section.

Accomplishment/IMPACT:

- The mushroom production program is providing a viable alternative to tobacco for small farmers in North Carolina. Since this program's inception in 2002, the number of small farm growers increased to over 243 by March, 2006. Based on average sales of $10 per pound, the total estimated sales in 2005 from a total of 35,355 inoculated logs was $1,060,650, resulting in an estimated average annual sales of $5,893 per mushroom grower.

- A micropropagation study has produced a breakthrough in protocol development for growing Alexandrian laurel, resulting in substantially shorter growing times and smaller percentages of planting loss. An invention disclosure for this process has been filed. Discussion is underway with the nursery industry to commercialize this technique. The application of this new technique will lead to faster and more successful production of this popular evergreen shrub.

- Eighteen community participants in a Goat Field Day series of workshops reported the sessions as highly informative presenting mostly new all or new information about goat farming and that they would definitely or probably use. Most of the participants were not currently raising goats but seven indicated plans to begin raising goats within the next two years.

Source of Federal Funds: Section 1445, Cooperative Extension, State Matching Funds

Scope of Impact: State Specific

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

1. Overview

Under Goal 2, the research has focused on assuring a safe and secure food system with emphasis on rapid detection of food pathogens.

Total Expenditures: Section 1445 and State Matching Funds = $1,802,962

FTE's: 4.4

1. ***Key Theme - Foodborne Pathogen Protection***

Description. A major effort has been focused on the development of rapid detection and control of pathogens in food. Methods of rapid detection being researched involve laser techniques and Fourier Transform InfraRed (FTIR). In addition, food scientists have been exploring the use of select spices as natural means for effective pathogen control. One project has resulted in the development of a simple and rapid method for screening antimicrobial activities of probiotic cultures.

Accomplishments/Impacts

- The use of probiotics as dietary adjuncts is a subject of intense and growing interest. Probiotic cultures have the ability to produce antimicrobial or antibiotic compounds. The food industry is very interested in techniques that can provide a simple and rapid method to screen probiotic cultures for antimicrobial or antibiotic activity. The most widely used method currently relies on many steps for isolation to test individual strains. The procedure is time-consuming and cumbersome and takes about 6-7 days to complete. Scientists at NCA&TSU have developed a rapid method (2-3 days) procedure for testing strains that is much simpler to implement. Recently, the dairy, fermentation, and supplement industry including the Jarrow Company, have started to use this method for testing antimicrobial activity of probiotic strains.

Source of Federal Funds: Section 1445; State Matching Funds

Scope of Impact: State specific

C. ***Goal 3: A healthy, well-nourished population***

1. **Overview**

Many chronic diseases including heart disease, stroke, hypertension, diabetes, and some forms of cancer are related to nutritional factors. The prevalence of some of these chronic conditions is higher among certain ethnic minority groups, including African Americans and Hispanics. While nutritional factors may be related to the incidence of these diseases, there is growing evidence that nutrients may also aid in the prevention and treatment of these conditions. Consequently, U.S. researchers are investigating the use of functional foods and nutraceuticals as means of addressing health problems and promoting good health.

Total Expenditures: Section 1445 and State Matching Funds = $975,781

FTE's: 3.2

2. *Key Theme –Human Health*

Description. Adequate nutrition is essential for human health and a number of chronic diseases are related to nutritional factors. Food scientists are addressing the problems associated with allergies in peanuts and have compared wild and cultured fish for nutritional quality.

Accomplishments/Impacts

- Food scientists with the Agricultural Research Program developed a new fermentation process that significantly reduces the allergenicity of peanuts. These investigators found that fermenting whole or ground peanuts with an edible fungus reduced the detectable level of major allergenic proteins Ara h1 and Ara h2 by as much as 70 percent. This breakthrough provides the opportunity to further develop a process that may help nearly 600,000 children (about 1 in every 125 children) currently affected by peanut allergies.

- A comparative study of the nutritional quality of cultured versus black sea bass grown in the wild reveals that the cultured fish has significantly higher protein, crude fat, and omega-d fatty acid content in compared to wild sea bass. These findings will help farm fisheries improve their market share by providing to consumers fish that provides better nutrition and health benefits than fish caught in the wild.

Source of Federal Funds: Section 1445; State Matching Funds

Scope of Impact: State specific

II. Stakeholder Input Process.

A. Sources of Gathering Input

The Agricultural Research Program (ARP) in the School of Agriculture and Environmental Sciences (SAES) at North Carolina Agricultural and Technical State University routinely seeks feedback from agriculturally related stakeholders through a variety of formal and informal interactions and planned activities. These contacts involve all administrative levels within the SAES including administrators, researchers, staff, and students. The stakeholders include agriculturally-related industries, agencies, community groups, and county residents.

Agricultural Research Program
The Dean of SAES serves as the Research Director and is responsible for ensuring that the School maintains routine contact with consumers of the Agricultural Research Program (ARP), which includes members of industry, alumni, community groups, and county residents. For the past two years, the Dean has served on the board of the NC Agribusiness Council, the trade industry for agribusiness in the state. Agribusiness is the largest industry in

North Carolina and produces almost $60 billion annually. The Dean also serves on a number of other agriculturally-related boards including the following; Agricultural Advancement Consortium (a consortium appointed by the Governor to develop a plan to revitalize farming in the state and to advocate for legislation at the state and national levels; North Carolina Agribusiness Council, North Carolina Agromedicine Institute, North Carolina Coalition of Rural and Farm Families, Inc., North Carolina Community Development Initiative, Inc., NC Farm Bureau Federation, and the Rural Advancement Fund International (RAFI).

The Dean also annually conducts information-gathering forums throughout the state to gain input on the programs and actions of the School. In these information-sharing forums, the School's research initiatives are presented, and input is sought about the value and impact of these projects. This input is used for refining and developing the program initiatives of the School.

SAES Advisory Council

An Advisory Council to SAES is composed of representatives from agriculturally-related companies as well as other stakeholders with related interests. The Council meets annually to discuss the direction and achievements of the School's academic efforts with students, but also responds to the research and Cooperative Extension activities. The group's input is used by the associate deans and department chairs, and is included in the strategic planning of the SAES' major program initiatives.

Annual Stakeholder Events

In addition to the formal meetings involving ARP administrators and stakeholders, the program conducts several annual outreach activities as a means for gathering input from those affected by the school's research activities or who use the research results. One major event is Small Farms Week, an activity jointly sponsored by the Cooperative Extension Program and the Agricultural Research Program. During this week, farmers, commodity group representatives, and consumers attend activities both on and off campus involving Extension and research. Through this activity, SAES is able to share information about research underway at the University, and receive input from those that use the research results. Other major outreach activities include field days that bring farmers, commodity groups, and consumers into direct contact with specific SAES research projects.

Feedback is also sought about research and research related activities by the researchers, their research teams, and by staff associated with ARP and the University; the input is then shared within SAES and incorporated into future research activities

Cooperative Extension Services Environmental Scan Data

North Carolina A&T's Cooperative Extension Program, in collaboration with the Cooperative Extension Service at NC State University, annually conducts an environmental scan which involves surveying county residents, advisory groups, commodity groups, government agencies, volunteers and other groups about agricultural issues. The respondents provide information regarding needs assessments, issues, trends and emerging issues. This information is shared with the Dean/Research Director as well as with associate deans, department chairs, and individual faculty. This information is also shared with the Strategic

Planning Council, an advisory board to the campus (NCA&TSU) Cooperative Extension Service group. This advisory board is composed of community leaders, agribusiness persons, teaching faculty, Cooperative Extension team members, and individuals representing non-governmental organizations. The Strategic Planning Council, along with the SAES Associate Dean for Research, meet to discuss and use this information in research project reviews, and for Extension planning in response to local and state needs and changes.

Department Level Advisory Boards

Two departments in SAES have main primary advisory boards, while some departments have additional advisory boards for departmental initiatives. These boards are composed of representatives from industry, public instruction, agencies, alumni and other groups that have a stake in the activities of the department in academic, research, and/or outreach efforts. The input from these boards is used in molding current as well as future activities of the respective department. Their feedback is documented and shared with the faculty, as well as with the dean, associate deans, and other department chairs.

Faculty Networking

A major source of feedback from stakeholders comes from the extensive interaction and networking by individual faculty members. Faculty members serve on agricultural interests boards, are members of agricultural related organizations, and attend meetings of groups that have a stake in the activities and projects of the Agricultural Research Program. The major concerns and issues that may develop into research studies are shared with other faculty members, the department chairs, the associate deans, and the Dean. This information is integrated into planning by the School, and is reflected in program initiatives and efforts to address interests and concerns of the diverse audiences served by the ARP. A faculty network that has been institutionalized is the “Industry-Agency Roundtable Breakfast” sponsored by the SAES Advisory Council.

Boards and Organizations

The administrators and faculty are represented on a broad variety of boards and organizations that provide opportunities to document issues and concerns in the state. These concerns and issues are then shared with others in the School. A representative list of the board and organizations appears below:

Advisory Board for Carolina Farm Stewardship Association

Agricultural Advancement Consortium (governor appointed group to revitalize farming in state)

American Dairy Science Association

American Society of Animal Science

Carolina Farm Stewardship Association

Center for Energy Research and Technology (campus based)

Center of Turfgrass Education and Research

City and Farm Committee, Guilford County Cooperative Extension Service

Conservation Council of North Carolina

Fashion Group International--Carolina Region

Guilford County Advisory Board on Environmental Quality

Institute of Food Technologists (IFT)

International Textiles and Apparel

North Carolina Agribusiness Council

North Carolina Agromedicine Institute

North Carolina 220 Swine Regional Group

North Carolina Association of Family and Consumer Sciences

North Carolina Board of Landscape Architects for License

North Carolina Cattlemen's Association

North Carolina Community Development Initiative, Inc.

North Carolina Coalition of Rural and Farm Families, Inc.

North Carolina Farm Bureau Federation

North Carolina Future Farmers of America

North Carolina Geology Advisory Board

North Carolina Institute of Nutrition

North Carolina Invasive Species Advisory Committee

North Carolina Pork Council

North Carolina Solar Energy Society

North Carolina Turf Grass Environmental and Education Board

Partnership of Under-Represented Scientists United for Education (PURSUE)

Rural Advancement Fund International (RAFI)

Sustainable Farming Program

B. How Groups are Selected as Stakeholders

The members of campus advisory boards are selected from the stakeholder groups that either use the research results produced or can employ students from the SAES degree programs. These persons are selected because of their positions in the various agencies, industries, or communities. Their input is solicited through informal sharing, as well as from more formal contractual or written requests.

C. How Stakeholder Input is Processed into Strategic Actions

As described individually under A. Sources of Gathering Input above, the information gathered from the stakeholders is shared with faculty and administrators mainly through face-to-face meetings and reports. The information is used to mold the strategic plans of the Agricultural Research Program and guides future development and use of resources.

III. Program Review Process

There have been no significant changes in our merit review and scientific peer review processes submitted as a supplement to our 5-Year Plan of Work.

IV. Evaluation of the Success of Multi and Joint Activities

Although 1890 institutions are not required to report in this section, we wish to note that NCA&TSU researchers are actively participating in a number of in regional research studies. The studies are listed below:

1. **“Impacts of Trade Agreements and Domestic Policies on the Competitiveness and Performance of Southern Agriculture” (SE-1016)**

2. **“Economic Assessment of Changes in Trade Agreements, Bio-terrorism Threats, and Renewable Fuels Requirements on the U. S. Grain and Oilseed Sector” (NCT 195)**

3. **“Genetic and Functional Genomic Approaches to Improve Production and Quality of Pork”**

4. **"Use of Microbial Phytase in Sow Diets"**