

North Carolina (North Carolina Agricultural and Technical State University, North Carolina State University Combined)

Plan of Work for 2023-2027

Status: Final (Approved 9/22/2022)

Executive Summary Overview

This Plan of Work includes research and extension programs for the College of Agriculture and Life Sciences (CALs) at North Carolina State University (NC State) and the College of Agriculture and Environmental Sciences (CAES) at North Carolina Agricultural and Technical State University (NCA&T). Our portfolios of solution-driven, cutting-edge research is creating new knowledge and technology which is then extended to all North Carolinians through NC Cooperative Extension. We are transforming science into everyday solutions that improve lives and allow North Carolinians to lead prosperous, healthy lives.

At North Carolina State University, the North Carolina Agricultural Research Service (NCARS) and NC State Extension are working hand in hand to solve the complex challenges facing food and agriculture. A statewide network of extension agents serves as the conduit through which the needs of the community are communicated to university researchers who then conduct research and formulate solutions. Extension agents then deliver essential information into the hands of growers, industry, and members of the community. The cycle continues as new challenges arise. Research and extension efforts at NC State focus on addressing four identified statewide critical issues: improving plant and animal agricultural systems; protecting environmental resources, enriching youth, family and community well-being; and enhancing food safety, nutrition and health.

Research efforts at NC State to Improve Plant and Animal Agricultural Systems focus on developing new methods to increase crop yields, developing new varieties, extending growing seasons, enhancing agricultural and environmental sustainability and producing new and improved technology. Through integrated research and extension programs, NC State is solving challenges related to the productivity and profitability of both large- and small-scale farms. Researchers and extension educators are also developing and disseminating knowledge and technology to improve landscaping and gardening. Research and extension programs in animal systems are focused on developing and disseminating knowledge and methods for animal breeding, reproduction, nutrition, genetics and genomics, physiology, environmental stress, product quality, and health and well-being.

NC State research and extension programs are promoting environmental stewardship and protecting the natural environment in efforts to Protect Environmental and Natural Resources through conservation and sustainable agriculture and timber production and climate smart agriculture practices. These integrated research and extension efforts also aim to tackle the critical issues impacting the quality of

our soil, water and air by providing scientific solutions for animal waste management, wastewater treatment, nutrient management, septic systems, wetland management, soil properties, and fishery and pond management.

NC State Extension continues to provide opportunities to Enrich Youth, Family and Community Well-Being through the 4-H youth development program. 4-H programs increase opportunities for youth to develop life skills, grow confidence, independence, resilience, and STEM skills through fun hands-on learning in safe, healthy, and enriching environments. Extension programs also address critical challenges affecting consumer and family well-being. In addition to youth development, other focus areas include parenting, childcare, family relationships, financial management, aging, healthy homes, and disaster readiness, response, and recovery. At the community level, Extension works with individuals, community groups and local governments on leadership skills, workforce development, entrepreneurship, civic engagement, volunteerism, community planning, and disaster preparedness

NC State's research and extension efforts to Enhance Food Safety, Nutrition and Health and to keep American's healthy and free from foodborne illness necessitate a focus on preventing food safety problems rather than taking a reactionary approach. NC State's integrated research and extension efforts focus on protecting the safety of foods along the entire supply chain, from production to consumption. To meet the growing need for healthy food, researchers are developing and producing new food products that promote health and prevent disease. At the same time, extension provides nutrition education programming to ensure that individuals, families, and communities have the knowledge they need to make informed choices about food and healthy lifestyles.

NCA&T encourages innovative and interdisciplinary research necessary to advance agricultural technology, solve the problem of food insecurity and save the environment. CAES conducts research on the university farm, at the Center for Environmental Farming Systems in Goldsboro (CEFS); at the Center of Excellence in Post-Harvest Technologies (CEPHT) in Kannapolis; and on campus in laboratories where investigations include agricultural economics, animal science, soil science, plant science, human nutrition, food science and bioenergy. CAES extension utilizes variety of instruments to assess the needs, make informed choices or set priorities on what educational programs Cooperative Extension needs to focus on. Thus, CAES engages in cutting-edge research and promotes the application of inter-and-trans-disciplinary integrative approaches that include the outreach of Extension to increase critical mass and impact. To move forward with this aim we are focusing on four integrative clusters (priorities): plant and animal agricultural systems; food safety, nutrition and health; youth, family and community well-being; and environmental and natural resources. Specifically, research and extension at NCA&T will continue to open doors and make an impact in the following ways:

Improving Plant and Animal Agricultural Systems: Within this area, we will work to address cross-cutting and emerging issues of animal and plant health and production. In animal system, researchers will study the efficiency of different feeding sources to improve animal productivity and gut health. In plant systems, the focus will be in sustainable agriculture, alternative and high value crop production, season extension, climate change adaptation, value added agriculture, digital agriculture, soil health, pest control, and agro economics. Extension will continue to expand its work with livestock producers, placing special emphasis on limited resources, small- scale minority farmers. The farm pavilion will focus

on sustainable agriculture and local and community food systems, housing its applied research and demonstration programs' staff and providing space for meetings, forums and conferences.

Enhancing Food Safety, Nutrition and Health: Within this area both research and extension will work to address the issue of human health, food safety and healthy living habits. The research will focus on whole grain cereals, human health and human nutrition, probiotics strains, food allergy, food production process, bioactive compounds of food, post-harvest technology and food security. Cooperative Extension and researchers at NCA&T will work together in a concerted effort to increase information and resources for African American families and children in rural communities who are often poor and disproportionately affected by high obesity rates and other health-related problems, such as high blood pressure and diabetes. This will be done through research that uses a community-based participatory approach as well as a prevention curriculum. A substantial plot of land at the university farm will be set aside for nearby residents of NCA&T to allow them to raise vegetables for their use. This program will be expanded out to assist local communities interested in establishing community gardens.

Enriching Youth, Family and Community Well-Being: CAES researchers and Extension staff are dedicated to working with NC's minority population, socially disadvantaged and disabled growers, elderly population, youth, and children to improve their lifestyle. Researchers will focus on the challenges of elderly population, textile and fashion design, healthy eating habit and childhood obesity. Extension will expand its financial resource management programming to ensure that those who are the most financially vulnerable are well equipped to make sound financial decisions for themselves and their families. 4-H programming will focus on areas such as STEM (science, technology, engineering, and math), leadership development, and agriscience. Innovation Station, the cutting-edge mobile learning experience, will continue traveling to counties throughout North Carolina, providing introductory and advanced STEM curricula for children in grades K-12.

Environmental and Natural Resources: In this area we will work to protect the natural environment, provide the solution for waste management and conventional energy. CAES researchers will investigate an advanced biological system to produce alternative energy, treat the agricultural and industrial waste, and protect and improve water quality. CAES researchers will be involved in multistate climate change project to study the impact of climate change in socially disadvantaged farmers and community of color. Researchers will be developing the adaptation and mitigation solution to improve agriculture and natural resources and will be proposing policies to address the issue of environmental justice and climate change. Extension will continue to support small scale producers and landowners in their effort to develop woodlot management plans while also integrating techniques and practices such as silvopasture production and riparian buffers

Merit and Scientific Peer Review Processes

At NC State a thorough scientific and merit review of each proposed HATCH project is conducted at the departmental level before submission to the North Carolina Agricultural Research Service (NCARS). This departmental review consists of an informal review (PI's responsibility) and a formal review (Department Head's responsibility). HATCH projects must be aligned with one of the critical issues from the Plan of Work. Next, research projects undergo a budgetary review and are submitted to USDA/NIFA for approval. The merit of Smith Lever Extension programs developed by Extension Specialists is determined by the Department Heads, State Program Leaders, and the Extension Director. Program

merit is guided by emerging needs identified through needs assessments, Extension agent feedback, state/local advisory councils, governmental officials, and commodity group or other stakeholder representatives. At the state level, extension leadership and specialists identify broad areas and scope for Extension to focus its work. At the local level district directors, county directors, and field faculty review local needs to develop local priorities and individual plans of action. At the local level, District and County directors assess the merit of Extension programming.

Evans-Allen projects are supported through the Office of Agricultural Research (OAR) in N.C. A&T State University's College of Agriculture and Environmental Sciences (CAES). The research director in conjunction with the leadership team, faculty and staff 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. This process assures that research proposals are scientifically sound, relevant to society's food and agricultural needs, and no duplication of efforts undertaken elsewhere. Prior to proposal development, alignment of the research topic with the needs of the state and the direction of the four program initiatives of CAES is determined. Upon agreement by the department chair, the associate dean for research, the research director, and the principal investigator, a proposal on the topic for submission through the Evans-Allen program is prepared. A merit review process is conducted that includes a review by an external panel comprised of individuals from both within and outside the University who are knowledgeable of or familiar with the area of research. Proposals are 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, proposals are transmitted to NIFA/USDA for approval. Upon NIFA approval, proposals are submitted to the OAR for budgetary review. State program leaders, specialists, regional extension directors and selected county faculty provide internal, merit review of extension program based on statewide needs, and stakeholder input. They collectively, develop extension programs; which provide the broad areas and scope for extension to focus its work. Program specialists develop specific objectives, program descriptions, measure of progress, impact indicators, cost-benefit analysis, and volunteer involvement/value for each objective. County Extension Centers select objectives that most fit local needs. They plan, implement and evaluate educational programs to address objectives outlined in the state plan of work.

Stakeholder input: Action Taken to Seek Stakeholder Input

NC State College of Agriculture and Life Sciences is committed to seeking, receiving, and using input from all stakeholder groups, including under-represented groups and the general public. NC State makes a concerted effort to involve and inform college partners and other stakeholders in planning efforts. The college is fortunate to work closely with a large number of North Carolina commodity organizations, biotechnology companies, service organizations and societies, agricultural advocacy groups and others to encourage their input and support. NC State Extension routinely reaches out to stakeholder groups including residents, governmental officials, advisory leaders, commodity group representatives, volunteers and other clients. County extension personnel interact daily with stakeholders in such a way that input is effectively gathered and communicated to administration and faculty. An Advisory Leadership System is functional in each of North Carolina's 100 counties and the Eastern Band of the Cherokee. The Advisory Council represents geographic, cultural and economic diversity within the communities we serve. This council provides the voice of the groups they represent. Extension county

staff serve on local boards and committees to encourage stakeholder involvement in Extension activities. Local extension staff attend community meetings and events and as members of the communities they serve, engage stakeholders and actively seek input. NC State Extension encourages past program participants and other stakeholders to join our electronic mailing list.

The CAES Advisory Board meets three times a year and provides advice and counsel on matters related to the College's strategic direction, priorities, and external relations, as well as advice on staying relevant and addressing the needs of its stakeholders. The Board is comprised of industry/commodity group leaders, alumni, students, partner agencies and small farmers. It provides eyes and ears into the communities served by N.C. A&T and provides a forum for CAES to hear from constituents and communicates information relating to research and outreach. The Strategic Planning Council (SPC) is the advisory leadership group for Cooperative Extension at N.C. A&T and is the voice for NC residents that lack the financial resources, educational background or other social factors, which limit their involvement in the decision-making process. Council members help Extension reach more clientele, ensure the relevancy of programs, and interpret the value of Extension to stakeholders. The SPC meets three times per year, one of which is a joint meeting with NC State's State Advisory Council. The Strategic Planning Council members also attend other special meetings to provide organizational review and input. Two members who serve on both councils facilitate networking and collaboration between both councils. With these organized groups emphasizing and providing 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.

Stakeholder input: Methods to Identify Individuals and Groups

NC State is committed to identifying and giving stakeholders the opportunity to provide feedback and ensure that local programs meet local needs and priorities. Stakeholders are identified through commodity groups, community partners, the Advisory Leadership System, volunteers, staff participation and attendance at community events, other clients, public outreach efforts, and the needs assessment process. Stakeholders are also identified through outreach efforts using mass media, social media, and the Extension website. The Advisory Leadership System, functional in each of North Carolina's 100 counties and among the Eastern Band of the Cherokee is used to identify groups and individuals from whom to collect input. The Advisory Council represents geographic, cultural and economic diversity within the communities we serve. The system provides a means to engage a comprehensive stakeholder group. This system is monitored administratively to assure that a diverse group of stakeholders are engaged.

The College of Agriculture and Environmental Sciences (CAES) works with its College and departmental advisory boards to identify stakeholders. These boards are comprised of industry, commodity and organizational groups, as well as small farmers and alumni, who help the College, identify stakeholders and assist with obtaining input into CAES' strategic direction and priorities. The Strategic Planning Council organizes community forums, focus groups, listening sessions and a grassroots leadership conference, which helps to identify the stakeholder to collect the input. The input from diverse groups of stakeholders are gathered via mail surveys, electronic/web surveys, focus groups.

Stakeholder input: Methods for Collecting Stakeholder Input

One source of stakeholder input comes from direct interactions NC State research scientists and county-based extension personnel have with families, schools, producers, industry and other agribusiness representatives. NC State maintains close ties with state agricultural industry associations, schools, and community organizations. The association boards identify high-priority research areas. NC State Extension conducts a formal needs assessment which includes collection of stakeholder input using mailed and online surveys, focus groups and interviews. NC State uses electronic/web surveys, one-on-one interviews, and focus groups to collect stakeholder input for the needs assessment and subsequent program prioritization process. Stakeholder input is also collected from advisory leadership councils located in each county. Strategic planning efforts in extension and for the entire college benefit from concentrated efforts by college leadership to engage stakeholders through listening sessions, focus groups, and state-wide conferences and workshops. Many of the departments within the College of Agriculture and Life Sciences have formal advisory groups with stakeholder members that meet on a regular basis providing input and direction for research and extension programs.

The Strategic Planning Council at Cooperative Extension at N.C.A&T organizes grassroots leadership conferences each year to collect input from the stakeholder from all three regions of NC (Mountains, Piedmont and Coastal Plains). Also, to ensure appropriate, inclusive and adequate stakeholder input, Cooperative Extension implements environmental scans in each county and on the Eastern Band of Cherokee Indian reservation. The scans provide a wide range of needs, issues, trends and emerging issues. They are submitted and stored in a central database. In addition, state specialists (at N.C. A&T and North Carolina State University) review and compile trend data relative to their area of expertise. Trend data are shared with county staff on alternate years or more often depending on the severity of the issue. Extension also conducts series of listening sessions, focus groups, and statewide conferences and workshops to get the feedback from stakeholders. In addition, CAES uses mail surveys, electronic/web surveys, focus groups, and community forums to collect stakeholder inputs for the needs assessment and program prioritization process. In spring 2021, we asked an external firm to conduct a statewide needs assessment to determine how to best meet the needs of the state's citizens in the areas of youth development, agricultural and natural resources, community and rural development, and family and consumer sciences. The external firm conducted focus groups, virtual interviews, mailed surveys, reviewed census data, and programmatic documents. The firm held 32 regional and three targeted focus groups and used a stakeholder list provided by Cooperative Extension. More than 630 individuals responded to the survey. This group included farmers, educators, community leaders, and parents of program participants. This process helped N.C. A&T in preparation for developing the renewed strategic direction based upon stated needs of citizens.

Stakeholder input: A Statement of How the Input Will Be Considered

Stakeholder input is used by both universities to set program priorities, identify emerging issues, redirect extension programs, redirect research priorities, set staffing priorities and direct budget priorities. Because research and extension activities are directed toward the development and implementation of new knowledge and technology, faculty members are constantly relating industry and consumer needs to the discovery process. Stakeholder input is used in determining research and extension directions and gaining program support and advocacy for research and extension initiatives. For example, the commodity association boards provide information on high-priority research areas to

be used in requests for proposals, and boards then decide which proposals to fund. This type of stakeholder input has a direct effect on research activities and subsequent extension programming. Our environmental scanning process identifies key issues of concern and needs of the community and allows us to translate these needs into science-based programs and services. Citizens, commodity association members and representatives, county commissioners, state legislators, and many other leaders and policy makers identify these emerging issues, program needs and priorities which inform program direction, budgets, staffing, and plans of action. This is a huge ongoing function that is ingrained in program planning and implementation for both Research and Extension. 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.

For the stakeholder input collected by NCATSU in 2021, it was used to set program priorities, identify emerging issues, redirect extension programs, redirect research priorities, set staffing priorities and direct budget priorities. Because research and extension activities are directed toward the development and implementation of new knowledge and technology, faculty members are constantly relating industry and consumer needs to the discovery process. Stakeholder input is also used in determining research and extension directions and gaining program support and advocacy for research and extension initiatives. For example, the commodity association boards provide information on high-priority research areas to be used in requests for proposals, and boards then decide which proposals to fund. This type of stakeholder input has a direct effect on research activities and subsequent extension programming. Our environmental scanning process identifies key issues of concern and needs of the community and allows us to translate these needs into science-based programs and services. Ninety percent of the participants were satisfied with the programs they'd participated in over the past three years, found them useful, and overwhelmingly recommends Cooperative Extension to their friends and colleagues. Recommendations from the survey participants helped us develop our commitments to how we will do our work and interact with those who use our programs and services. Based on the results, N.C. A&T intends to (1) continue to focus on programming in areas that serve our primary clientele, small farmers and limited-resource population, (2) continue to work with and use the resources of the entire cooperative extension and land-grant university system to identify best practices and implement programs and activities when they are a good fit for our audiences, (3) work with N.C. State University and all state-and-county-based partners to ensure that all of the states' citizens are receiving quality programs and treated with respect and dignity, (4) intensify our collaboration and partnership with N.C. State University and ensure that all campus and field-based staff are aware of all assets, resources, and opportunities, and (5) implement strategies that are designed to meet program needs. The recommendations from participants and commitments helped form the foundation for the strategies that will guide us through 2023 as we decide how to allocate our time, resources, and efforts. These strategies will drive our strategic plan, "Mission Possible: Continuing to Inspire North Carolinians to Improve Their Lives".

Critical Issues

Enhancing Food Safety, Nutrition and Health

Initiated on: Nov 26, 2019

State: North Carolina

Term Length: Long-term (>5 years)

There is a critical need to ensure we have a safe and nutritious food supply. Our efforts help protect the safety of the food supply through research and extension efforts focused on all levels along the food supply chain, from production to consumption. To meet the growing need for healthy food, our work includes development and production of new food products that promote health and prevent disease. There is also a critical need to ensure that individuals, families, and communities have the knowledge to make choices about selecting nutritious food and living healthy lifestyles that reduce their risk of chronic disease and that they have access to safe, high-quality food at reasonable prices.

Science Emphasis Area

Family & Consumer Sciences, Food Safety, Human Nutrition

Enriching Youth, Family & Community Well-Being

Initiated on: Nov 26, 2019

State: North Carolina

Term Length: Long-term (>5 years)

There is a critical need for youth to develop skills necessary for future success. Our work provides opportunities for youth to participate in 4-H clubs, camps, school enrichment, afterschool and special interest programs. There is also a critical need to address the challenges affecting consumer and family well-being. Our research and outreach focus on areas such as parenting, child care, family relationships, financial management, aging, healthy homes, and disaster readiness, response, and recovery. Critical issues facing communities include economic, social and environmental resiliency. Our programs focus on leadership, workforce development, entrepreneurship, civic engagement, volunteerism, community planning, and disaster preparedness.

Science Emphasis Area

Environmental Systems, Family & Consumer Sciences, Food Safety, Human Nutrition, Sustainable Agricultural Production Systems, Youth Development

Improving Plant and Animal Agricultural Systems

Initiated on: Nov 26, 2019

State: North Carolina

Term Length: Long-term (>5 years)

There is a critical need to increase agricultural food, fiber, and fuel productivity and to increase the profitability of farms and agribusinesses while providing safe, nutritious food for a growing population and being good stewards of our natural resources. Plant systems address plant production, protection, the development of new plant varieties and plant products, organic farming, landscaping, gardening, and discovering and disseminating solutions to production issues including weeds, pests and diseases. Animal systems focus on developing and disseminating knowledge and methods for animal breeding, reproduction, nutrition, genetics and genomics, physiology, environmental stress, product quality, health, wellbeing and biosecurity.

Science Emphasis Area

Bioeconomy, Bioenergy, and Bioproducts, Family & Consumer Sciences, Food Safety, Sustainable Agricultural Production Systems

Protecting Environmental and Natural Resources

Initiated on: Nov 26, 2019

State: North Carolina

Term Length: Long-term (>5 years)

There is a critical need to proactively and comprehensively promote environmental stewardship and to protect the natural environment through conservation and sustainable agriculture and timber production and to subsequently address the critical issues impacting the quality of our soil, water, and air. Our work includes providing scientific solutions for animal waste management, wastewater treatment, nutrient management, septic systems, wetland management, soil properties, and fishery and pond management. Programs support the expansion of production systems for biofuels and bio-based products including non-petroleum-based fuels, power sources, and chemicals. We also provide support for forestry, wood products and tourism.

Science Emphasis Area

Agroclimate Science, Bioeconomy, Bioenergy, and Bioproducts, Environmental Systems, Family & Consumer Sciences