

Annual Report to the Chancellor | College of Agriculture and Life Sciences (2011-2012)

Changes in the Service Environment

Dean Johnny Wynne will retire effective July 1, 2012. Dr. Wynne led the College, as either dean or interim dean, for nearly a decade during perhaps the most difficult fiscal period in the College's history. His leadership and knowledge of both the College and North Carolina's agricultural and life sciences communities will be missed. At the same time, Dr. Ken Esbenshade, associate dean and director of CALS Academic Programs, has announced plans to return to the faculty. Dr. Esbenshade's leadership will also be missed. The College owes a great debt to both Dr. Wynne and Dr. Esbenshade for their service. Their leadership helped make the College of Agriculture and Life Sciences the strong, forward-looking institution it is today.

The availability of funding, both at the federal and state level, has been problematic for a number of years now. The best adjective to describe funding at this juncture would seem to be uncertain. The economy seems to be improving, although slowly, which could point toward an improved funding picture. At the same time, this is an election year, and it seems exceedingly unclear what this fall's elections, both at the federal and state levels, will bring, not to mention how those elections may eventually impact funding.

There seems to be increasing recognition among policy makers and elected officials that we are likely to face significant challenges in coming years as a result of global population growth. It is projected the world's population will approach 9 billion people by mid-century. Food production will have to increase dramatically at a time when there is little additional arable land available, while efforts to feed the world will put pressure on resources such as water and fuel. There seems to be a growing realization that research in institutions like the College of Agriculture and Life Sciences offer our best hope for meeting tomorrow's challenges. We see this as a positive development and are hopeful that as the economy improves, policy makers and elected officials will increasingly realize the value of our programs.

At the same time, there appears to be increasing interest among young people in agriculture, particularly in the local food movement. This may be in part because agriculture is a bright spot in the economy, but it may also represent a realization among young people that agriculture and life sciences research does provide a means to answering tomorrow's challenges and that an education in agriculture and the life sciences opens up significant opportunities.

We are, therefore, cautiously optimistic. We cannot help but be concerned that College programs will be adequately funded, yet we feel we are well-positioned to address the challenges it is likely the future will hold.

Initiatives: Major initiatives and/or changes to programs or activities

We continue to focus on the following overarching goals.

- Providing students and Cooperative Extension clientele with the knowledge and skills they need to succeed in a rapidly changing world;
- Producing well-trained, socially responsible graduates who are ready to contribute to North Carolina and make a difference in their communities;
- Fostering economic vitality by generating and applying science and technology that support robust agricultural and life sciences industries;
- Conserving and improving the state's natural resources and environment;
- Improving the health, well-being and quality of life of North Carolina's individuals and communities.

In addition, we are working with the state's agricultural community to expand the amount of grain North Carolina produces. North Carolina's animal industry, worth more than \$6 billion annually in cash receipts to farmers, needs grain for animal feed. At present, much of the animal feed used in North Carolina is corn imported from the Midwest. Indeed, North Carolina is the second largest corn importer in the world, behind only China. As corn prices have risen, North Carolina's animal agriculture, particularly the swine industry, has been put at a competitive disadvantage. We have mounted an effort through research and Extension programs to produce more grain in North Carolina. Research and Extension efforts are focusing on wheat and grain sorghum production as well as corn.

Researchers are looking at where and how growers may produce grain, while Extension is passing this information along to growers. In addition, agricultural economists are looking at grain production contracts that may stimulate production while also protecting growers and buyers.

Other examples of CALS initiatives are included in the "Examples that illustrate the strategic goals in the strategic plan" at the end of this report.

Diversity: Initiatives and Progress

The College of Agriculture and Life Sciences was recognized for efforts to promote equity, diversity and inclusion by the university Office for Institutional Equity and Diversity with a 2012 Diversity Award in the college/division category. The award recognizes a college or division that demonstrates commitment to diversity and inclusion. Over the years, the College has implemented action steps from its Strategic Plan for Diversity that are the critical building blocks of a solid foundation of diversity and inclusivity. The first building block is providing professional development workshops focused on building diversity awareness and cultural competence. This is a proven strategy for improving work environments. CALS has sponsored the Opening Doors program for the past seven years, reaching nearly 300 faculty and staff. Using open discussion, self-examination and objective social systems analysis, this program provides a framework for increasing diversity awareness and enhancing a person's ability to create an inclusive organization. Three-day Opening Doors retreats were held three times in the 2011 calendar year. Two three-day sessions have been held in 2012 thus far. For the past three years, the Office of Institutional Equity and Diversity has sponsored one of the sessions each year to afford university employees who do not work in CALS the opportunity to benefit from Opening Doors. To date, 39 university employees from other colleges and units have participated in Opening Doors. Evaluations consistently indicate that Opening Doors is effective. For the most recent workshop, the mean scores for all Opening Doors evaluation questions ranged from 4.3 to 4.7 out of 5. Also, over 90% of participants either agreed or strongly agreed that they: 1) increased their awareness of diversity, 2) increased their ability to advocate for diversity, 3) plan to change behaviors to be more inclusive, and 4) plan to be an ally for diversity in their professional lives.

Systemic organizational change also requires comprehensive, ongoing initiatives involving many organization members of the organization who are strong advocates for inclusion. One such group of allies is the interdisciplinary CALS Diversity Council, which was formed in 2008 and has met monthly since its inception to develop and implement strategies to address priority needs. Contributing to the success of female faculty and faculty of color is a council priority outlined in the strategic plan. For at least the past eight years, CALS has sponsored a female faculty networking event. In the past four years, a strong professional development component was added to the event, wherein women gain education and insight on topics they identified as salient to their success as faculty. The March 14, 2012 session focused on Getting Large-scale Interdisciplinary, Inter-institutional Grants.

Another priority outlined in the strategic plan is increasing student diversity. The CALS Office for Diversity Affairs and Diversity Council continue to engage in innovative programming to achieve this aim. For example, enrollment of all underrepresented groups is lower than we would like. However, enrollment of male students from underrepresented groups lags behind that of their female counterparts by more than 50% in some cases. In its fourth year, the Creating Awareness of Agriculture and Life Sciences Disciplines, Degree Programs and Discoveries project (CAALS 3D) was developed in response to this need. CAALS 3D serves male NC School of Science and Math (NCSSM) students from underrepresented groups to increase their awareness and interest in academic programs and research and career fields within the food, agricultural, environmental and life sciences. Twenty-six male NCSSM students worked with 11 CALS faculty in their labs for one week in July 2011. The CAALS 3D Program launched a mentor-guided research component two years ago that allows students who participated in CAALS 3D during the summer to work with faculty for 5 to 10 hours per week during the academic year or full-time during the summer. Data from the first cohort to graduate from NCSSM are promising; 45% of the minority males are now enrolled as freshman at NC State, with 33% majoring in CALS disciplines. According to NCSSM's Vice Chancellor for Student Affairs, this was the first time that such a large number of students chose N.C. State. It should be noted that these students have their choice of universities. Our College's program, in part, is helping N.C. State be the university of choice for these students. CALS also participates in the CHAMPS visitation programs for underrepresented undergraduate students. CHAMPS focuses on private historically black colleges and universities (HBCUs). In addition,

for the past three years, CALS has held its Explore visitation program to make undergraduate students from public HBCUs more aware of graduate programs in agricultural and life science disciplines. In April 2012, CALS hosted 14 students and two faculty from South Carolina State University. We connect these CHAMPS and Explore students to other opportunities at NC State, including summer research experiences for undergraduates. Additionally, the Dean's Graduate Research Assistantship, now in its third year, was developed to recruit new graduate students from underrepresented groups. Three doctoral and one incoming master's student (Fall 2012) are recipients of the assistantship. This assistantship has increased CALS African-American doctoral student enrollment by nearly 20%. Retention of underrepresented students is also a priority. The College continues to teach sections of the USC 110D course for first-year students from underrepresented groups. The course outlines critical skills for time management, note taking, study techniques, test taking, stress management and decision making. The CALS section of USC 110D incorporates a guest speaker series to introduce students to professional role models from different industries. Past evaluations show that students who completed the course have a significantly higher first semester grade point average than similar students electing not to take the course. Also, the College continues to support and provide a faculty advisor for the student chapter of the National Society of Minorities in Agriculture, Natural Resources and Related Sciences (MANRRS) and the Minority Association of Pre-Health Students (MAPS). In addition, the College sponsors personal, academic and professional development activities in collaboration with MANRRS and MAPS students throughout the year. The CALS Office of Diversity Affairs is committed to linking underrepresented students with opportunities to conduct research. In 2011-12, the Assistant Dean for Diversity, Outreach and Engagement assisted seven undergraduate students in gaining academic year and summer research opportunities in top CALS laboratories. Faculty in the Biological Sciences Department offer two retention programs: 1) Reaching Incoming Student Enrichment (RISE) and 2) Howard Hughes Research Scholars (HHR) Program. RISE provides a six-week introduction to scientific research. The two-year HHR program provides outstanding sophomore, junior and senior undergraduates with experience conducting scientific research in an NC State laboratory during the academic year and in the summer. Graduate student retention is also a focus. The Diversity Council sponsors several workshops and seminars tailored to the needs of CALS graduate students. Two graduate students who sit on the council coordinate these educational and retention efforts. The CALS Office of Diversity Affairs also connects graduate students to professional and academic development opportunities offered by the Graduate School and other units across campus.

The CALS Latino student population is increasing and to address the needs of this audience and contribute to their success at NC State as well as build on Latino student recruitment, the CALS Diversity Council established the CALS Latino Initiative, which is spearheaded by a subcommittee of council members. The Latino Initiative consists of four main components: 1) Each One Reach One faculty-student mentoring program (four CALS faculty are mentoring student protégés, with additional faculty-student assignments planned for Fall 2012); 2) Latino Speaker's Bureau, which addresses the lack of Latino scientists serving as role models in K-12 schools; 3) Bone Scholars Program and Service Project, (Bone Scholars mentor high school students from migrant farm working backgrounds similar to their own); and 4) a community/parent outreach component, which is a partnership with the Juntos Extension Program.

Finally, the College is committed to increasing diversity among its postdoctoral population. In 2012, the College established the Dean's Postdoctoral Fellowship. The purpose of the postdoctoral fellowship is to provide outstanding scientists from underrepresented groups with increased opportunities to further develop the research skills acquired in their doctoral programs, learn new research techniques and gain additional college teaching experience. The first Dean's Postdoctoral Fellow will begin in the fall of 2012.

Instructional Program Advances, including curriculum development and program review

Curriculum reform continued in the 2011-2012 academic year. At the undergraduate level, there were no major curricula revisions made to undergraduate degree programs; however, there were minor curricula revisions made to the Biological Sciences, Biological Engineering, Nutrition Science, Plant and Soil Sciences and Turfgrass Science degree programs. No curriculum changes were made at the graduate level during this academic year. Two new graduate level programs have been proposed, a new concentration in Crop Management and Improvement under the Master of Crop Science degree and a new accelerated bachelor's/master's program in Plant Biology. Minor curricula revisions were also made to the undergraduate minors in Biological Sciences, Poultry Science and Zoology. There was a minor revision to the Agribusiness Management concentration in the Agricultural Institute also. Fifteen

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new undergraduate and 24 new graduate courses were approved; 28 undergraduate courses and eight graduate courses were revised; and one undergraduate and three graduate courses were dropped. In addition, one new Agricultural Institute course was approved, one was revised and one course dropped. Undergraduate and graduate program review and assessment continued to be a point of emphasis. The departments of Crop Science and Molecular and Structural Biochemistry underwent comprehensive reviews, with external peers participating. When seniors were asked to rate the quality of instruction in their major, 96% rated their education either excellent or good and 97% reported that the faculty set high expectations for learning.

Research: Volume of activity and achievements of significance

The North Carolina Agricultural Research Service (NCARS) is the principal state agency responsible for agricultural and life sciences research, providing the scientific foundation for CALS Academic and Extension programs. Collaborators include CNR, PAMS, COE, CHASS, CVM and the School of Agriculture and Environmental Sciences at NC A&T State University. The NC Research Campus at Kannapolis involves collaborations among NCSU, UNC-CH, UNC-G, UNC-C, NCCU, NC A&T, ASU and Duke University. Development continued at two aquaculture research and demonstration sites; we are in the final stages of developing a funded agreement with the Biofuels Center of North Carolina for field research space at Williamsdale Biofuels Field Laboratory; and the integrated NCSU Dairy Enterprise System is completing its second year of operation, including completion of its new, modern milking parlor and development of a tractor leasing arrangement with a local distributor. Continued progress was made on renovations to move aquatic species from the Biological Resources Facility to the Grinnells laboratory, and the NSF-ARI-R2 funded renovation of the Phytotron is progressing. This project should be complete in 2013 and provide a state-of-the-art controlled environment facility with containment for investigation of high-risk plant pathogens and other microbes.

NCARS personnel, supported by federal, state, grant and/or gift funding, include 368 research scientists; 634 graduate students, researchers, research assistants and post-doctoral students; and 490 technicians and support staff. Many have joint appointments with Academic Programs and/or Extension. The faculty and support personnel oversee 501 federal, state and regional research projects, supporting over 70 commodities, related agribusinesses and life sciences industries. CALS scientists submitted 990 funding proposals, requesting a total of \$224,895,317; 711 proposals were awarded, totaling \$79,489,588. Research expenditures totaled \$134,291,468. NCARS development activities generated over \$3 million in endowments and other support for college research; pending requests total \$8.1 million to support AMPLIFY, CEFS, Sweet Potato Campaign, the dairy program and other research functions. Faculty filed 41 invention disclosures; 11 new plant varieties were released; 22 patents were issued and 37 commercialization agreements were executed on NCARS inventions and technologies.

Representative achievements of NCARS research activities include the following.

At the Plants for Human Health Institute, research and extension programs aim to enhance the nutritional value of fruits and vegetables and related compounds, to improve human health and prevent disease as well as contribute to the economic viability of NC agriculture. Through the institute, the CALS supports faculty from the departments of Horticultural Science; Food, Bioprocessing and Nutrition Sciences; Plant Biology; Genetics; and Agricultural and Resource Economics. Since opening, the institute has received \$2.1 million in gift donations, \$7.8 million in federal and private competitive grants, including \$200,000 from the Golden LEAF Foundation, \$1.42 million from the NC Tobacco Trust Fund Commission, \$2 million from NCD&CS and USDA, \$780,000 from UNC General Administration, and \$1.05 million from commodity groups and other private sponsors. This funding is in addition to state appropriations. This summer the institute will add one faculty member in systems biology; one post-doctoral fellow specializing in NMR technology; one greenhouse operations technician supporting the plant breeding program; two research specialists; five new graduate students; four Kannapolis Scholars, five visiting scholars; and 22 interns, bringing the total number of faculty, staff, graduate students and support personnel to 75. In addition, the institute will add 12,000 square feet of greenhouse space and nine walk-in growth chambers. Contact: Dr. Steve Lommel (NCARS); Dr. Mary Ann Lilia (Food, Bioprocessing and Nutrition Sciences)

The NCSU Processed Meats Laboratory assisted **RDI Foods, LLC**, a Raleigh-based contract consulting company, to develop nutritionally enhanced, shelf-stable meat snacks for U.S. Military forces deployed around the world.

Products were formulated to include caffeine (energy boost) and quercetin (natural anti-inflammatory agent from onion skins) and do not require refrigeration. Contact: Dr. Dana Hansen (Food, Bioprocessing and Nutrition Sciences)

Research in thermal processing and packaging of foods and biomaterials has generated 15 U.S. patents (six pending) and over 30 granted international patents. Technologies include continuous-flow microwave pasteurization and sterilization, microwave-assisted aseptic processing and packaging and conventional and continuous-flow thermal processing of multiphase (particulate) foods. Technologies from this program are the bases for five companies operating in North Carolina, and the technologies for shelf-stable, aseptically packaged chunky soups are being used for products introduced to consumer markets in France, Belgium and the Netherlands. Contact: Drs. Josip Simunovic and Ken Swartzel (Food, Bioprocessing and Nutrition Sciences)

Stink bugs have emerged as a major yield and profit damaging pest of cotton. Damage is hard to assess, and static treatment thresholds have not been well correlated with yield loss. Thus, many fields are either sprayed unnecessarily or not treated when needed. With Cotton, Inc. regional funding, entomologists in Southeast and Mid-South cotton states developed a Stink Bug Decision Aid field card, based on the concept of a "dynamic threshold," which bases treatment on vulnerability to boll damage as a function of week of bloom. Research indicated that use of the dynamic threshold concept yielded a profit advantage of \$7.50 to \$30 per acre (depending on stink bug levels) compared to the static threshold. Surveys in 2011 indicated that 81% of licensed consultants were using the field card, and its usefulness was rated 8.5 on a scale of 10. If only 20% of North Carolina growers used the device in 2011, their profit advantage would have been over \$13 million, and the advantage would have been even greater for automatic calendar sprays or not spraying on unscouted cotton. Contact: Dr. Jack Bacheler (Entomology)

Maximizing effectiveness of *Bacillus thuringiensis* (Bt) in crop plants. When resistance develops to Bt, growers often have to revert to using conventional insecticides, which can be detrimental to beneficial insects and cause other environmental disruptions. Research findings over 18 years have been instrumental in convincing EPA and the industry that rapid pest adaptation can be slowed, resulting in maintaining insect protection from Bt technologies for longer times. EPA mandates that growers using crops that express the Bt toxin must engage specific resistance management approaches. Even though in the short term, growers have to sacrifice a certain amount of profit, the long term benefits of delaying resistance and using more benign control strategies are considered advantageous. Contact: Dr. Fred Gould (Entomology)

Increasing wheat yields. Wheat yield is highly dependent on tiller development and maintenance. Tillers develop once the main plant has three leaves. Slow fall plant development impairs how quickly tillers are generated. Early tillers are more likely to avoid decline, and later tillers are of little value to the plant or yields. Over 80% of the yield from wheat comes from fall and early tillers. A wheat management system based on effective fall fertilization was designed to stimulate early tiller development and applying N just before jointing. There was a dramatic increase in productive tillers and an increase in yield from 65 to 102 bushels per acre. In 2010-11 over 600,000 acres of wheat averaged 62 bushels per acre. If the system advantage (37 bushels/acre) was attributed to this research and only one-fourth of growers used the management approach, the economic impact is estimated at over \$33 million. Contact: Dr. Ron Heiniger (Crop Science)

Actuarial Modeling of Crop Risks for Federal Crop Insurance. Dr. Keith Collins, USDA chief economist, has stated: "...the Board of the Federal Crop Insurance Corporation has relied heavily on Dr. (Barry) Goodwin's analysis of the feasibility of potential new insurance products that could be offered for sale to producers. Dr. Goodwin has conducted economic and actuarial analyses for the Board on some of the most difficult issues the Board has faced, such as reconciling alternative rating methods to produce consistent premiums for producers. In addition, he has done pioneering work on numerous crop insurance issues, such as farm demand for insurance. The Board has made decisions affecting many hundreds of millions of dollars in insured liability based on Dr. Goodwin's analyses." Liability in the U.S. crop insurance program typically exceeds \$85 billion, so even small errors could lead to substantial taxpayer losses. Contact: Dr. Barry Goodwin (Agricultural and Resource Economics)

Advances in hybrid striped bass production. Hybrid striped bass production is the fourth largest form of fish farming in the U.S. However, production is static at about 14 million pounds. Major production advances in the context of a high-cost, low-price environment will depend on superior breeding stock that are disease-free and produce superior growth rates, cultural or management strategies to reduce costs, and economical compliance with environmental

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requirements for discharged water from farms. NCSU's domestication of striped bass and white bass opened the door to selective breeding of a genetically improved, high-performance hybrid striped bass while providing a reliable alternative to collection of wild broodfish for spawning. Genetic and protein biomarkers (insulin-like growth factor) can be used to instantaneously assess growth status, which allows for rapid assessment of variables that best promote fish growth. A pulsed feeding regimen reduces labor costs and feed costs by 10 to 15%. Through reduction in feed requirements and improved feed efficiency, nutrient loading in pond effluent can be reduced 40%. New water conservation approaches have reduced pond effluents by 50% and pumping costs by 25%. Contacts: Craig Sullivan, Russell Borski, Harry Daniels (Biology)

Management innovations in swine and poultry production. When replacement gilts were raised in litters with reduced competition among piglets, the proportion of resulting sows that gave birth to six or more litters increased by 20%. This advantage in sow longevity is associated with 14 additional piglets produced per replacement female bred over six parities and as much as \$1,500 additional income per sow. A multidisciplinary research team is showing that changing the feed particle size of corn in broiler chicken diets improves feed conversion ratio with reduced nitrogen and moisture in the excreta. Industry implementation is expected to generate economic benefits and reductions in resource use and environmental emissions. At current feed prices, the feed conversion economic gain for this altered feed processing strategy is projected to exceed \$100 million in the U.S. annually. Contacts: Dr. William Flowers (Animal Science); Dr. C.M. (Mike) Williams (Poultry Science); Dr. John Brake (Poultry Science)

Creative opportunities for animal feeds. In response to high prices of corn and other traditional cattle supplements, applied research and extension educational programs have helped producers expand the use of byproduct feeds for beef cattle. In 2011, 10,000 tons of soybean hulls, 6,000 tons of dry corn gluten feed, 8,000 tons of wet corn gluten feed and 10,000 tons of other miscellaneous byproducts were fed by cattle producers for a realized savings of over \$1 million.

Capturing more value from sweet potatoes. Concerns about food safety and contamination have led pet food manufacturers to seek domestic sources of processed sweet potatoes, a gluten-free source of carbohydrates. After 25,000 pounds of off-grade and misshapen sweet potatoes were sliced and dried in tobacco barns on a cooperator's farm, the resulting material was supplied to several potential users. Responses were so positive that the cooperator and another company are planning commercial drying facilities within the year to produce sliced, dried sweet potatoes for animal feed manufacturing. Contacts: Dr. Matt Poore (Animal Science); Dr. Michael Boyette (Biological and Agricultural Engineering)

Toxic site remediation and cleanup. Molecular tracers were used to identify naturally-occurring soil bacteria that rapidly biodegrade important groundwater pollutants, such as the gasoline additive, methyl tertiary butyl ether and its immediate byproduct, tertiary butyl alcohol (TBA). Cleanup processes employing these and other closely related bacteria are now widely used throughout the United States. Our research has also demonstrated that another hydrocarbon, isobutane, is oxidized by soil bacteria to generate TBA. Isobutane is an important component in not only gasoline but also natural gas and liquefied petroleum gas. This research is of considerable importance in understanding the environmental impact of hydraulic fracturing on groundwater supplies. Additional research focuses on microorganisms capable of degrading another important groundwater contaminant, 1,4-dioxane. Nationwide, cleanup costs of sites contaminated by gasoline oxygenates and potentially hydraulic fracturing sites are likely to be measured in the billions rather than the millions of dollars over the next decades. Contact: Dr. Michael Hyman (Microbiology)

Identifying vaccine candidates. A new, generally fatal, malaria-like disease of domestic cats has emerged in the southeastern U.S., including North Carolina. The high morbidity, mortality and growing epidemic point to the need for a vaccine, but as the causative agent (the tick-borne parasite *Cytauxzoon felis*) is yet to be cultured, traditional vaccine development is beyond reach. NC State researchers sequenced, assembled and annotated the entire *C. felis* genome. Alignment of the *C. felis* genome sequence with the sequence of the related bovine parasite, *Theileria parva*, revealed a gene, Cf76, in precisely the same position in the genome as the leading vaccine candidate for bovine Theileriosis. Hyperimmune sera from cats surviving cytauxzoonosis is strongly reactive with synthetic Cf76, demonstrating recognition by the feline immune response. Our bioinformatic approach emphasizes the use of

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comparative genomics as an accelerated path to identify vaccine candidates from experimentally intractable pathogens. Contact: Dr. David Bird (Plant Pathology); Dr. Adam Birkenheuer (CVM)

Protecting poultry. *Salmonella* is a human pathogen associated with consumption of raw or undercooked contaminated poultry products. Dr. Hosni Hassan has developed an attenuated *Salmonella*, which has been awarded a provisional patent. Dr. Hassan and Dr. Matt Koci have begun experiments to determine if this strain is capable of inducing immunity to *Salmonella* in poultry, such that birds vaccinated with this strain better resist colonization by pathogenic species. They have also begun work to develop strategies whereby this *Salmonella* strain could be used as a vector to deliver other clinically relevant antigens and induce immunity against multiple pathogens at once. These studies will lead to the development of novel vaccines and vaccine protocols that help poultry resist colonization by *Salmonella*, thereby reducing the risk of contamination of poultry food products and ultimately reducing the impact of *Salmonella* induced food borne disease. Contact: Dr. Matt Koci (Poultry Science); Dr. Hosni Hassan (Microbiology)

Siting septic systems properly. On-site wastewater systems account for 50% of the wastewater treatment systems in the state. The current BMPs for siting systems may lead to premature failure of systems. A failed septic system poses an environmental and public health risk and severely reduces property values. NCSU research has shown that the current method of assessing soil wetness overestimates the depth to seasonal wetness, a major cause of system failure. Locating and installing systems shallower in the soil, based on revised soil criteria, may save the cost of repairing or replacing a failing system. Currently, approximately \$70 million (30% of the total estimated \$250 million for the industry as a whole) is spent annually on repairing failed systems. Proper siting of systems based on more conservative soil criteria could save North Carolinians several million dollars as well as alleviate environmental and public health risks. Contact: Dr. David Lindbo (Soil Science)

Extension: Initiatives and public service activities

Established in 1914, the North Carolina Cooperative Extension Service is part of NC State University's College of Agriculture and Life Sciences and a national Cooperative Extension Network. The Extension Service partners with County and Tribal governments and NC A&T State University's Cooperative Extension Program to provide seamless educational programs that enrich the lives, land and economy of North Carolinians. Extension programs meet people's needs, supply decision makers with unbiased data and help individuals, families and communities succeed.

Scope

Extension serves citizens, businesses and communities in all 100 counties and the Eastern Band of the Cherokee Nation, providing expertise from 17 CALS departments, three College of Natural Resources departments, the College of Design and the College of Veterinary Medicine. Extension collaborates with CALS academic and research faculty, other university extension and engagement units, land-grant institutions across the U.S., state, national and international agencies and associations. State and county advisory councils inform program priorities, development and implementation and serve as Extension advocates

NC Cooperative Extension's Demographic Outreach

In calendar year 2011, NC Cooperative Extension's educational programs and information were used by 4,783,369 residents. Feedback showed that participants put a value on Extension programs of over \$230 million. Non-degree credit hours of training were offered to 603,171 participants for a total of 103,841 hours of instruction during Extension educational meetings, workshops, seminars and demonstrations. Extension also provided professional certification classes in over 39 different program areas to individuals and businesses. Certification trainings range from pesticide applicators and storm water best management practices and maintenance to day-care providers and rain garden certification for landscapers. In 2011, 38,288 individuals attended Extension certification training classes. This was an increase of 8,741 participants from 2010, which is remarkable considering the significant reduction in agents due to budget cuts. Of those attending classes, 18,635 received recertification, and 6,943 were certified for the first time.

Extension ranks high among state agencies and organizations in volunteer commitment. Commitments to our programs are a strong indicator of the value state residents see in the outcomes and impacts Extension provides in

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their communities. In 2011, 43,076 Extension volunteers provided 802,677 hours of service with a value of \$16,254,209.

Extension provided educational programs and programming to schools and school children throughout the state (K-12). In 2011, Extension served 1,365 administrators, 8,423 teachers and 168,767 students. The value of these programs, as calculated by the university formula for K-12, was \$8,654,666.

2011 Extension Program Areas and Economic Impact

- Profitable and Sustainable Agriculture - \$52.2 million
- Safety and Security of Food and Farm System - \$100.8 million
- Local Food Systems - \$2.6 million
- Family Financial Management Skills - \$ 1.7 million
- Healthy Eating, Physical Activity and Chronic Disease Risk Reduction - \$24.2 million
- Natural Resources Conservation and Environmental Sustainability - \$9.7 million
- Urban and Consumer Agriculture - \$6.5 million
- Parenting and Caregiver Skills -\$1.7 million
- Volunteerism - \$19.0 million
- School to Career - \$10.9 million
- Energy Conservation - \$437,000
- Community Development - \$387,200

Examples of Extension Program impacts in 2011

- More than 520,000 acres of farmland are enrolled in conservation easement, farmland protecting programs, voluntary agricultural districts or present use value programs.
- Nearly 230,000 acres are under best management practices to protect natural resources.
- 61,200 youth gained science, technology and math knowledge.
- Extension local food coordinators promoting the 10% Campaign encouraged consumers and businesses to spend \$13 million on local foods since July 2010.
- 23,337 youth gained work place employment skills.
- 61,500 homeowners used appropriate fertilization practices.
- 15,695 participants adopted practices to conserve energy in their homes.
- 622,600 households added more fruits and vegetables to their diets.

Financial Leveraging

For every dollar invested in Extension by the state, Extension leverages an additional \$1.75 from other sources. When including impacts as determined by clients, every dollar provided Extension by the state returned an additional \$7.43 in 2011.

Grants, Contracts and Foundations

Extension grants and contracts totaled \$ 16,320,030; 44.7% was from counties and 55.3% from departments. Extension Foundation accounts expended \$5,967,188.

Changes in Service Environment

Extension received a 12.3% budget cut for the last fiscal year, greatly impacting campus and county faculty, county partnerships and client programs and services. Cuts were mostly achieved through reorganization of a centralized college business office, reduction of Extension districts to 5, reduction of the Professional and Organizational Development unit to one position and through the reduction of department technicians and SPA positions. In addition, 63 county positions were cut, resulting in additional losses in matching local funds.

Concerns for the Future

Extension is prioritizing and focusing its programs. This will take time and changes in employee and client expectations. Also looming is a potential Federal budget cut that could reach 10 to 12% (\$1.1 to \$1.8 million) if the federal budget or Farm Bill is not passed. This would significantly impact CES and require additional cuts to all units.

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Approximately 40% of the remaining funds in the Extension budget after the state cut were targeted to fill nearly 30 additional county vacancies. However, some of these funds were not returned by the University on a continuing basis and could not be used for that purpose. There are significant concerns that these funds will not be returned for their intended Extension purpose. This would exacerbate the current voids in meeting client needs and county government expectations.

Faculty: Honors, awards and recognition

ALEXANDER QUARLES HOLLADAY MEDAL FOR EXCELLENCE - Fred Gould, Entomology; and William R. Atchley, Genetics;
FELLOW, AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE - E. Allen Foegeding, Food, Bioprocessing and Nutrition Sciences; and Fred Gould, Entomology;
FELLOW, INTERNATIONAL SOCIETY FOR HORTICULTURAL SCIENCE - Sylvia M. Blankenship, Horticultural Science;
FELLOW, AMERICAN SOCIETY FOR HORTICULTURAL SCIENCE - E. Barclay Poling, Horticultural Science;
ALUMNI DISTINGUISHED UNDERGRADUATE PROFESSOR AWARD – James A. Knopp, Molecular and Structural Biochemistry; and Janet F. Spears, Crop Science;
BOARD OF GOVERNORS AWARD FOR EXCELLENCE IN TEACHING - Sarah L. Ash, Food, Bioprocessing and Nutrition Sciences;

Awards by Department

4-H Youth Development and Family and Consumer Sciences

ACADEMY OF OUTSTANDING FACULTY ENGAGE IN EXTENSION; OUTSTANDING EXTENSION SERVICE AWARD – Mary C. Wiggins;
APPLIED GERONTOLOGIST AWARD - Lucy Bearon; **EARLY ACHIEVEMENT AWARD** - Andrew O. Behnke; **COMMUNITY OF PRACTICE ACHIEVEMENT AWARD** - Andrew O. Behnke; **DEAN DON FELKER FINANCIAL MANAGEMENT AWARD, SOUTHERN REGION** - Carolyn L. Bird; **OUTSTANDING EXTENSION PROGRAM AWARD** - Carolyn L. Bird; **MARSHA RIDDLE LIFETIME ACHIEVEMENT AWARD** – Harriett C. Edwards; **OUTSTANDING EXTENSION PROGRAM AWARD** - Jacquelyn W. McClelland;

Agricultural and Extension Education

ACADEMY OF OUTSTANDING TEACHERS - Mark J. Kristler; **OUTSTANDING TEACHER AWARD** – Mark J. Kistler; **DISTINGUISHED TEACHING AWARD** - Mark J. Kristler; **OUTSTANDING ACHIEVEMENT AWARD** - Koralalage Sunil Upali Jayaratne; **RISING STAR AWARD** - David W.W. Jones; **HONORARY STATE FFA DEGREE** - David W.W. Jones; **LEADERSHIP FELLOW** - David W.W. Jones; **SOUTHERN REGION OUTSTANDING AGRICULTURAL EDUCATOR AWARD** - Elizabeth B. Wilson;

Agricultural and Resource Economics

NC STATE COMMUNITY ENGAGED FACULTY FELLOW - Edward L. Kick; **BEST ARTICLE AWARD FOR CHOICES MAGAZINE** - Michele C. Marra; **MARVIN COLLINS PLANNING AWARD** - Christy Perrin; **OUTSTANDING EXTENSION PROGRAM AWARD FOR PROJECT: RURAL TAX EDUCATION** - Guido van der Hoeven; **ARTICLE OF THE YEAR FOR 2010** - Roger H. von Haefen; **PRESIDENT'S AWARD** - Tom Vukina; **EXCELLENCE IN PUBLIC SERVICE** - Michael L. Walden;

Animal Science

TEACHING FELLOW AWARD - Charlotte E. Farin; **MASTERS OF THE PORK INDUSTRY** - William L. Flowers; **HOARD'S DAIRYMAN YOUTH DEVELOPMENT AWARD** - Brinton A. Hopkins; **SOUTHERN REGIONAL OUTSTANDING TEACHER AWARD** - Jeannette A. Moore; **OUTSTANDING GRADUATE INSTRUCTOR AWARD** - Charlotte E. Farin;

Biological and Agricultural Engineering

TEACHING FELLOW AWARD - Gary T. Roberson; **A.W. FARRALL YOUNG EDUCATOR AWARD** – Mari S. Chinn; **EDUCATIONAL ACHIEVEMENT AWARD** - Greg Jennings; **STATE GRANGE SEARCH FOR EXCELLENCE** - Garry L. Grabow;

Biology

OUTSTANDING FACULTY ADVISER AWARD - Jill Anderson;

Crop Science

BAILEY AWARD - Thomas G. Isleib, Crop Science; and Susana Rita Milla-Lewis, Crop Science;

Entomology

2011 FRIENDS OF SOUTHERN IPM FUTURE LEADER - Hannah Joy Burrack; **HONORARY MEMBERSHIP** - George G. Kennedy; **SILVERSTEIN-SIMEONE AWARD** - Coby J. Schal;

Food, Bioprocessing and Nutrition Sciences

OUTSTANDING FACULTY ADVISER AWARD - April Morrison; **INDUSTRIAL ACHIEVEMENT AWARD** - Josip Simunovic; **OUTSTANDING GRADUATE STUDENT TEACHING AWARD** - April Fogleman; **OPAL MANN GREEN ENGAGEMENT AND SCHOLARSHIP AWARD** - Suzie Goodell; **INNOVATOR OF THE YEAR** - Ken R. Swartzel;

Horticultural Science

OUTSTANDING TEACHER AWARD - William C. Fonteno and Helen Tyler Kraus; **BEST VITICULTURE PAPER** - Sara E. Spayd; **SYDNEY B. MEADOWS AWARD OF MERIT** - Ted E. Bilderback; **OUTSTANDING ALUMNI AWARD** - Frank A. Blazich; **ALEX LAURIE AWARD** - Brian E. Whipker; **EDUCATIONAL AIDS BLUE RIBBON AWARD** - Ted E. Bilderback; **MID CAREER SERVICE AWARD** - Lucy Bradley and Wayne G. Buhler; **NORTH CAROLINA STATE GRANGE SEARCH FOR EXCELLENCE OUTSTANDING PROGRAM INITIATIVE AWARD, SPECIALISTS CATEGORY** - Lucy Bradley, Gina E. Fernandez and Wayne G. Buhler; **PESTICIDE STEWARDSHIP AWARD** - Wayne G. Buhler; **GOLD AWARD FOR BEST TECHNICAL BOOK** - Helen Tyler Kraus; **TEACHING FELLOW AWARD** - Helen Tyler Kraus; **EMMY, INFORMATION/INSTRUCTIONAL SERIES** - Bryce H. Lane; **GOLD AWARD FOR BEST TECHNICAL BOOK** - Anne M. Spafford; **INDUSTRY SUPPORT AWARD** - Allan C. Thornton; **EDUCATOR OF THE YEAR AWARD** - Allan C. Thornton; **DISTINGUISHED SERVICE AWARD** - Elizabeth A. Driscoll; **GEORGE J. AND RHODA W. KRIZ FACULTY STUDY LEAVE ENDOWMENT AWARD** - Anne M. Spafford;

Microbiology

TEACHING AWARD OF MERIT - Geraldine H. Luginbuhl;

Plant Biology

OUTSTANDING TEACHER AWARD - Chad Victor Jordan, Plant Biology; **OUTSTANDING GRADUATE STUDENT TEACHING AWARD** - Lissete Betancour;

Poultry Science

OUTSTANDING NEW FACULTY ADVISER AWARD - Jackie B. Golden; **STUDENT RECRUITMENT AWARD** - Jackie B. Golden; **BIOLOGY SCHOLARS PROGRAM RESEARCH RESIDENCY** - Jackie B. Golden; **THANK A TEACHER AWARD** - Jackie B. Golden; **NC STATE UNIVERSITY NEW FACULTY AWARD** - Jackie B. Golden;

Soil Science

ACADEMY OF OUTSTANDING FACULTY ENGAGED IN EXTENSION; OUTSTANDING EXTENSION SERVICE AWARD – Richard A. McLaughlin; **OUTSTANDING EXTENSION SERVICE AWARD** – Richard A. McLaughlin; **OPAL MANN GREEN ENGAGEMENT AND SCHOLARSHIP AWARD** - Julie Grossman; **EDUCATIONAL ACHIEVEMENT AWARD** - Richard A. McLaughlin;

Extension Awards

DISTINGUISHED SERVICE AWARD - Spring Williams Byrd, Burke County; **DISTINGUISHED SERVICE AWARD (NATIONAL ASSOCIATION OF COUNTY AGRICULTURAL AGENTS)** - Sam Groce, Chatham County; **FELLOW, SUSTAINABLE AGRICULTURE RESEARCH AND EDUCATION** - Mark W. Blevins, Brunswick County; **SEARCH FOR EXCELLENCE IN REMOTE SENSING AND PRECISION AGRICULTURE** - Mark W. Blevins, Brunswick County; **AWARDS FOR EXCELLENCE** - Michelle Shooter, Robeson County; **SEARCH FOR EXCELLENCE IN YOUNG, BEGINNING OR SMALL FARMERS AND RANCHERS** – Mark W. Blevins, Brunswick County; **EDGAR J. AND ETHEL B. BOONE ADULT EDUCATION AWARD** - Kyleen M. Burgess, Hertford County; and Eileen A. Coite, Wayne County; **MERITORIOUS SERVICE AWARD** – Spring Williams Byrd, Burke County; **DALTON R. PROCTOR Award** - Spring Williams Byrd, Burke County; **CHARLES M. BRICKHOUSE DEVELOPMENT AWARD** – Spring Williams Byrd, Burke County; **LOIS G. BRITT OUTSTANDING EXTENSION AGENT AWARD** - T. Bryan Cave, Surry County; **DR. RUSSELL C. KING AND MRS. CONNIE H. KING EXTENSION PROGRAM TEAMWORK AWARD FOR THE NORTHEAST REGION OF NORTH CAROLINA** – Robert Paul Filbrun, Edgecombe County, and Lesa R. Walton, Edgecombe County; **DR. R. MARSHALL AND MRS. JAN STEWART 4-H LEADERSHIP AWARD** - Linda Whitaker Gore, Moore County; **BILLY AND WILMA CALDWELL EXTENSION LEADERSHIP AWARD** - Reba M. Green-Holley, Gates County; **GEORGE AND VIRGINIA HYATT EXTENSION SCHOLARSHIP AWARD** - Louise L. Hinsley, Beaufort County; Alan D Meijer, Department of Soil Science; and Bill C. Stone, Lee County; **4-H EXCELLENCE IN TEAMWORK** - Pamela F. Jones, Vance County; **NORTH CAROLINA STATE GRANGE SEARCH FOR EXCELLENCE OUTSTANDING PROGRAM INITIATIVE AWARD, ADMINISTRATIVE AND LEADERSHIP CATEGORY** - Carolyn L. Langley, Randolph County; **CHET AND LUCY BLACK 4-H PROFESSIONAL DEVELOPMENT SCHOLARSHIP** - Carolyn L. Langley, Randolph County; **DR. NADINE TOPE FAMILY AND CONSUMER SCIENCES PROGRAM DEVELOPMENT AWARD** - Jeannie Misenhiemer Leonard, Davidson County; and Jayne Lee McBurney, Johnston County; **COMMUNICATIONS AWARD, PROGRAM PROMOTIONAL PIECE** - Paul G. McKenzie, Vance County; **CLARA Y. MOTLEY 4-H AND FAMILY AND CONSUMER SCIENCES AWARD** - Mary Campen Morris, Bertie County; **VICTORIA JEAN COPE NC 4-H PROFESSIONAL DEVELOPMENT AWARD** - Ellen H. Owens, Currituck County; **EXCELLENCE IN CAMPING AWARD** - Ellen H. Owens, Currituck County; **CAROL M. BIRCKHEAD AWARD FOR OUTSTANDING COUNTY EXTENSION DIRECTOR** - Howard F. Scott, Wayne County; **CAROLYN STANLEY BARNES AND GEORGE EDWARD BARNES 4-H GRADUATE EDUCATION SCHOLARSHIP** - Angela R. Shaver, Cumberland County; **COMMUNICATION AWARD, PUBLISHED PHOTO AND CAPTION** - Michelle Shooter, Robeson County; **AGRICULTURAL AWARENESS AND APPRECIATION AWARD** - Michelle Shooter, Robeson County; **LATHAN F. SMITH, JR. AWARD OF EXCELLENCE IN 4-H** - Crystal M. Smith, Warren County; **DR. SANDRA ZASLOW FCS PROFESSIONAL DEVELOPMENT**

AWARD - Verlene D. Stephenson, Northampton County; **ILA McILWEAN WHITE FAMILY AND CONSUMER SCIENCE PROGRAM ENDOWMENT AWARD** - Jewel Langley Winslow, Perquimans County

Students: Honors, measures of quality and student activities

In the fall 2011 Semester, there were 335 students enrolled in the Agricultural Institute, 4,658 students in the undergraduate program and 968 students in the graduate program. There were 782 beginning freshmen and 251 new transfer students enrolled in the undergraduate program, 245 new graduate students and 147 beginning and new transfer students in the Agricultural Institute. For incoming freshmen, the average SAT total was 1180, the average weighted high school GPA was 4.35, and 52% of students were in the top 10% of their high school graduating class. Measures of quality for incoming freshmen in the College were similar to those of the University. CALS incoming freshmen received 8 of the 47 Park Scholarships. Many incoming CALS freshman were invited and chose to participate in University honors and scholars programs. The College had 38 incoming University Honors students, 89 incoming University Scholars students and nine incoming Jefferson Scholars. The College awarded \$817,000 in scholarships to more than 550 students during the 2011-2012 academic year. Forty-five student clubs and organizations were affiliated with the College, and 46 students served as CALS Ambassadors. The academic success and achievement of our students continue to bring accolades to the College. During the 2011-2012 academic year, Brinda Monian, a double major in Biochemistry and Chemical Engineering and Ian Thomas Hill, a double major in Biochemistry and Polymer and Color Chemistry, were awarded the prestigious Goldwater Scholarship. The College also served 445 students in the College's Honors Program, which requires a minimum GPA of 3.35. During the 2011-2012 academic year, 148 associate degrees were awarded to 89 Agricultural Institute graduates. In addition, 1,188 baccalaureate degrees were awarded to 1,070 students. Of these, 15% graduated cum laude, 14% graduated magna cum laude and 13% graduated summa cum laude. Of the graduates, 107 participated in the College's Honors Program and completed program requirements. (Note: Graduation totals are preliminary pending the completion of graduation clearance for the May 2012 commencement exercises.) The College's Career Services office saw increases in the number of students using services during 2011-2012: 6,969 students heard classroom announcements; 2,495 students heard a career presentation in one of their classes; 1,101 students attended one-on-one counseling sessions; 5,465 students participated in an optional professional development workshop; 1,170 students attended Career Expo; 335 students were enrolled in a career course for credit; 198 industry representatives visited campus to share career advice; and 6,392 new jobs and internships were posted on ePack. Improved technology initiatives included major updates to CALS Career Services website and the addition of an Event Roadmap to help students navigate the workshop and event options. Nineteen corporate sponsors contributed to workshops, programs and job-shadowing opportunities. Freshman and sophomore retention rates were 91% and 85% respectively, while four-year and five-year graduation rates were 48% and 71% respectively, indicating that CALS students are successful and graduating on time.

Fund Raising: Private fund-raising successes

The CALS College Advancement Office raised more than \$20 million in gifts and new commitments as of May 30, 2012. This total again leads the colleges at NC State University in fund raising. In addition, the implementation of the 5 percent gift fee has allowed us to create and fund a senior director of major gifts position, which is occupied by Ms. Chandy Christian, who is also serving as our interim campaign director. This fee is generating \$300,000 to \$350,000 annually in new funds to support fund-raising activities for CALS. These funds are assisting in the reorganization of the CALS College Advancement Office and a new emphasis on major gift fundraising. We do anticipate a gift commitment of \$10 million to name the Department of Poultry Science at the end of the current fiscal year or near the beginning of 2012-13.

The LaPaz project and LLC continue to make progress towards the successful completion of the research project and profitability. Our 30,000 shares of Albion Medical Holdings stock paid a \$15 dividend per share in May of 2012, totaling more than \$455,000. These funds will be used to pay down the BB&T LaPaz loan.

Our goals for next year include: a preliminary goal to raise a total of \$20 million in gifts and new commitments; continue to monitor the gift fee process and report on use of the gift fee funding, ensuring that it is being spent in accordance with the Chancellor's Gift Fee Policy; complete implementation of the CALS CA reorganization plan, including all necessary hires and staff changes. Our challenges for next year include: the economy continues to be a

barrier to greater success in fund raising, a situation that will most likely continue for some time; concerns over the state budget and potential budget cuts continue to be an issue of concern relative to staffing and morale; and the implementation of a comprehensive campaign plan for CALS.

We also look forward to the announcement of a new dean for CALS and working with the College to introduce the new dean to our many constituents and to receiving the new dean's input and direction for the new campaign.

Administration: Achievements and staff changes

- John Sabella was appointed Interim Assistant Dean for International Programs.
- Jeff Mullahey was appointed head of the Department of Crop Science.
- Chris Daubert was appointed head of the Department of Food, Bioprocessing and Nutrition Sciences.

The College put into place a central business office. This office consolidates human resources, budgeting, accounting, contracts and grants, purchasing and bookkeeping functions. Previously, these functions were spread throughout the College, usually housed in departments.

Recommendations and concerns for the future

We have expressed concern in past reports about the condition of some CALS facilities. Many of our labs and classrooms, particularly in buildings such as Williams Hall and Gardner Hall, are badly in need of renovation. We must provide top-notch facilities if we hope to keep and attract the best faculty and students. The condition of some CALS facilities continues to be a major concern.

In addition, the University plan to move biological sciences programs from CALS to a new College of Sciences is a concern. This plan was announced as this report was being prepared, so the proximity of the announcement may well have colored this report. Nevertheless, we are concerned about the impact this plan will have on the College, particularly because it is unclear how many CALS faculty will move to the new college.

We believe it is important to maintain the connection and collaboration we now have between the agricultural and life sciences, and the movement of faculty and programs from CALS could jeopardize the strong links we now have between agricultural and life sciences.

We see agricultural and life sciences programs assuming increasing importance in coming years. Society in the global sense faces a range of challenges associated with global population growth, from food production to environmental degradation and fuel production. The world's population is expected to increase by 2 billion people by mid-century, and this growth is expected to put tremendous strains on existing systems. We will need more food (50 to 100 percent more, most experts think) and more energy. Population growth may also make providing for human health and well-being and economic development and protecting the environment more difficult.

We believe agricultural and life sciences programs and research will play a major role in addressing these challenges. Agricultural and life sciences programs will obviously be needed to increase food production. We believe the world will also look to these disciplines to help prevent environmental degradation and even for fuel production in the form of bio-based fuels. In addition, strong agricultural and life sciences programs will aid in economic development here at home in North Carolina. Developing countries are likely to import both food and technology as standards of living rise, and our programs can help North Carolinians take advantage of these developing markets.

At the same time, interest in smaller scale farming continues to rise. Consumers are interested in purchasing local food, while there also appears to be increasing interest in producing for niche and local markets. We have responded with programs such as the Center for Environmental Farming Systems and the Plants for Human Health Institute on the NC Research Campus in Kannapolis.

We see the world turning to institutions with strong agricultural and life sciences programs both for strategies to meet challenges associated with growth and for economic development. The institutions with the strongest programs are likely to prosper, and we believe the College of Agriculture and Life Sciences can be among these institutions.

Examples that illustrate the strategic goals in the strategic plan

1. Enhance the success of our students through educational innovation

The Veterinary Professions Advising Center, perhaps better known as VetPAC, is designed to aid CALS undergraduates who are interested in applying to veterinary schools and pursuing a career in veterinary medicine. VetPAC provides centralized advising on the veterinary profession and the veterinary school application process. This center, which is directed by Dr. Shweta Trivedi, teaching assistant professor in the Department of Animal Science and a veterinarian, provides current veterinary, animal-health and related professional publications, such as *JAVMA*, the *N.C Biotechnology Directory*, *Veterinary Practice News*, *Exotic DVM: A Practical Resource for Clinicians* and *CVM: the Magazine of the College of Veterinary Medicine at NC State University*. Also available are various guides for taking the Graduate Record Exam and other information for prospective graduate students.

In addition, a VetPAC interns program allows students to earn up to two credit hours for an on-campus learning experience under the direct mentorship of Dr. Trivedi. Interns have the opportunity to participate in the fall N.C. Veterinary Conference, an annual American Pre-Veterinary Medical Association symposia trip, the HistoPath Conference at the N.C. State College of Veterinary Medicine, spend-a-day sessions with CVM faculty members and a once-a-semester paid lunch with CVM students. They also are eligible for letters of recommendation for internships from Dr. Trivedi.

A VetPAC seminar series is another valuable resource for students, offering presentations on the veterinary profession and the veterinary school application process. VetPAC has also partnered with the Wake County Animal Center in a joint certification program in the care of shelter animals. The program provides undergraduate students the opportunity to experience all aspects of shelter animal care. Participants gain valuable experience in animal husbandry and animal behavior and in assisting veterinary staff and health-care technicians. Upon completion of the program, students receive a certificate from VetPAC.

2. Enhance scholarship and research by investing in faculty and infrastructure.

A unique teaching postdoctoral program is giving the next generation of teachers valuable experience while exposing students to the latest technology. Cutting edge new courses are also being developed as part of the program. This initiative allows for three teaching postdoctoral associates in the Biotechnology Program. The initiative is geared toward individuals who may have done a research postdoc already or may be straight out of graduate school, and who are interested in a college-level teaching career focused on undergraduate education. Program participants are exceptional researchers, but they do not do research. They teach, publish papers related to their teaching and develop new courses. Indeed, the program is an incubator for course development. Among the courses developed are BIT 100, Current Topics in Biotechnology. In addition, teaching postdocs have developed upper-level lab courses on new mRNA transcription and processing, site-directed mutagenesis, experimental analysis of protein-protein interactions, RNA interference (RNAi) and cell-signaling techniques. Program participants also teach BIT 410 and 510, core courses in manipulation and expression of recombinant DNA. During the summer, teaching postdocs mentor undergraduates involved in research projects. This program provides our students with enthusiastic and highly motivated teachers while preparing those teachers to become part of the academic world. The program was developed by Dr. Sue Carson, professor of Plant Biology, and Biotechnology Program Director Dr. Bob Kelly.

3. Enhance interdisciplinary scholarship to address the grand challenges of society.

We are in the process of developing an initiative we call AMPLIFY, which stands for Agrosphere Modeling for Producing Large Increases in Food Yield. AMPLIFY is an effort to discover patterns, networks and key variables underlying crop input and yield relationships. Research to build this knowledge base will come from multidisciplinary teams. The scientists who make up these teams will work together to employ new and emerging technologies to monitor and analyze plant and soil processes in response to changes in agricultural practices and environmental stresses. This research will enable better water and nitrogen management, enhanced monitoring of plant and soil health, improved prediction of the effects of cropping systems, integrated pest and disease management, targeted genetic modification of plants, a more powerful use of precision agriculture and the development of new economic

models. Integration of these key components will deliver new multidimensional predictive models to enhance agricultural productivity within a sound ecological context.

4. Enhance organizational excellence by creating a culture of constant improvement.

The College of Agriculture and Life Sciences consolidated human resources, budgeting, accounting, contracts and grants, purchasing and bookkeeping functions in a central business office. Previously, these functions were spread throughout the College, usually housed in departments. Creation of this new central office and consolidation of business functions allows for more efficient business operations. It also allows us to standardize the way business operations are performed across the College, which was not always the case when operations were dispersed throughout the College.

5. Enhance local and global engagement through focused strategic partnerships.

The College, through the N.C. Cooperative Extension Service, is a national leader in helping growers tap into the increasingly lucrative local foods market. In 1994, we partnered with NC A&T State University and the NC Department of Agriculture and Consumer Services to develop the Center for Environmental Farming Systems, at the time a unique effort dedicated to sustainable agriculture research, extension and education. From CEFS came the 10% Campaign, an effort to encourage consumers to spend 10 percent of their food dollars locally. Since 2010, the 10% Campaign has recorded more than \$13 million in local food purchases. The campaign is backed by the efforts of Cooperative Extension local food coordinators in counties across the state.

Cooperative Extension is involved in helping communities capitalize on local food opportunities across North Carolina. In Surry County, Cooperative Extension's Bryan Cave and other leaders recognized that tobacco growers transitioning to growing fruits and vegetables needed a way to sell their crops. Extension helped develop Pilot Mountain Pride, a marketing and branding organization, for Surry County produce. Similarly, Cooperative Extension helped to develop organizations such as the North Carolina Mushroom Growers Association and the North Carolina Natural Hog Growers Association, offering opportunities for small growers and producers to develop the skills they need to make their enterprises successful and find markets to support their work. These and other collaborative programs involving local foods are having an economic impact across North Carolina.

- end -