health and well-being expertise

Whether by digging deep into the basic life sciences to discover what makes certain people susceptible to a given disease, teaching parents how to make the most nutritious food choices for their families, or helping prepare tomorrow's health-care professionals, N.C. State University's College of Agriculture and Life Sciences is improving human health and well-being in North Carolina and beyond.

Through research, for example, our scientists are finding new ways to deliver vaccines, creating foods that boost health and developing compounds to destroy disease-causing, antibiotic-resistant biofilms. Our undergraduate programs help position graduates for acceptance to and success at medical, pharmacy and dental schools. And our extension programs give people of all ages, in all of North Carolina's 100 counties, the knowledge they need to adopt healthier lifestyles.

Read on to learn more about how the College is making a difference.
Scientists with the College of Agriculture and Life Sciences recognize that the same sciences that make it possible to produce healthier crops and livestock can also have a profound impact on human health. Our expertise spans a range of disciplines and touches on myriad health-related areas.

Find out who's doing what by browsing through the listings and the stories in these categories:

- Disease Prevention and Treatment
- Economic and Statistical Analysis
- The Environment and Health
- Food and Nutrition Research
- Food Safety
- Hunger, Obesity and Nutrition Education
- Plants for Health
- Preparation of Health Leaders
- Well-Being

You can also find more on the web at our “Making a Difference for Health and Well-Being” site at http://www.cals.ncsu.edu/agcomm/difference/Health/. There you'll also find links to academic programs geared for students who want to pursue careers in diverse health fields.
When it comes to battling diseases that have vexed mankind for millennia, you won't find any more committed scientists than the biochemists, biologists, microbiologists, geneticists, toxicologists and others in the College of Agriculture and Life Sciences who are working together across disciplines and with partners in other agencies and universities on a range of human health problems, from cancer and atherosclerosis to malaria and Lyme disease. Because of that commitment, we know more about these diseases, and we have better tools to fight them.

Robert Anholt
William Neal Reynolds Professor and Director, W.M. Keck Center for Behavioral Biology
919-515-1173
robert_anholt@ncsu.edu
Understanding chemosensory behavior in Drosophila, a powerful genetic model system for human health (startle behavior, alcohol sensitivity, glaucoma)

Charles Apperson
William Neal Reynolds Professor Entomology
919-515-4326
charles_apperson@ncsu.edu
Development of insect and tick repellents and textiles to protect humans and animals from vector-borne diseases

What Dr. Dennis Brown and Dr. Raquel Hernandez, a husband-and-wife research team in the Department of Molecular and Structural Biochemistry, are learning about a virus called Sindbis could lead to vaccines for a range of diseases.

Vaccines work, of course, by provoking a mild response to a disease, thus teaching the body to recognize and fight the disease. Brown and Hernandez discovered a way to alter the Sindbis virus to produce a Sindbis mutant that does not reproduce when it infects mammalian cells but reproduces normally in insect cells.

Insect cell reproduction means large amounts of the virus can be produced. The inability to infect a mammalian host, like a person, means the virus causes an immune reaction but not disease.

While Sindbis does not cause disease, viruses similar to Sindbis, such as those that cause dengue and yellow fever, do. It should be possible to alter these Sindbis cousins the same way Sindbis was changed to create vaccines. The alteration technology, which was patented, was licensed to a company called Arbovax, which is developing vaccines for dengue fever, West Nile fever and Chikungunya fever.

More recently, Brown and Hernandez discovered a way to increase the capacity of the Sindbis virus, which is small, to deliver large amounts of genetic material to a cell. This discovery, also patented, opens the possibility the virus could become a vehicle to deliver genetic therapies.
Expertise in disease treatment and prevention

Melissa Ashwell
Associate Professor
Animal Science
919-513-7488
melissa_ashwell@ncsu.edu
Investigation of changes in chondrocyte gene expression following an impact injury and how these changes relate to observed tissue damage (early stages of osteoarthritis)

Clay Clark
Associate Professor
Molecular and Structural Biochemistry
919-515-5805
clay_clark@ncsu.edu
Investigation of protein folding and the role of amino acid sequence identity in determining folding pathways of homologous proteins significant in a number of human diseases

Fred Gould
William Neal Reynolds Professor
Entomology
919-515-1647
fred_gould@ncsu.edu
Development of methods to suppress disease from dengue viruses based on use of transgenic strains of mosquitoes that can no longer transmit the virus to humans

James Bonner
Associate Professor
Environmental and Molecular Toxicology
919-515-8615
james_bonner@ncsu.edu
Research on the cellular and molecular mechanisms of lung injury and repair in models of environmental lung diseases such as pulmonary fibrosis and asthma, with emphasis on toxicology of nano-materials

Rob Dunn
Assistant Professor
Biology
919-513-7569
rob_dunn@ncsu.edu
Research on the geography of human diseases

Hosni Hassan
Professor
Microbiology
919-515-7081
hosni_hassan@ncsu.edu
Investigation of the global regulatory roles of redox and iron in metabolism and virulence of Salmonella to help in developing next generation of vaccines against Salmonellosis and other diseases; and development of engineered probiotic organisms for the delivery of antioxidant enzymes to the human gut for the treatment of inflammatory bowel diseases

Dennis Brown
Professor and Department Head
Molecular and Structural Biochemistry
919-515-5802
dennis_brown@ncsu.edu
Development of vaccines against four dengue virus serotypes as well as Chikungunya and West Nile viruses

Vivek Fellner
Associate Professor
Animal Science
919-515-4018
vivek_fellner@ncsu.edu
Identification and enhancement of potent anti-cancer and anti-obesity compounds found only in ruminant fat; research into methane mitigation to improve environmental quality

James Brown
Associate Professor and Undergraduate Teaching Coordinator
Microbiology
919-515-8803
james_brown@ncsu.edu
Investigation of RNA structure and function, microbial diversity and molecular evolution

Raquel Hernandez
Research Associate Professor
Molecular and Structural Biochemistry
919-515-5786
raquel_hernandez@ncsu.edu
Development of vaccines against four dengue virus serotypes as well as Chikungunya and West Nile viruses

Scott Kullman
Assistant Professor
Environmental and Molecular Toxicology
919-515-4378
swkullma@ncsu.edu
Research on the activity and regulation of drug and xenobiotic metabolizing enzymes, mechanisms of endocrine disruption as a modulatory factor in carcinogenesis, toxicogenomics and applied environmental toxicology

Billy Flowers
Alumni Distinguished Professor
Animal Science
919-515-4003
william_flowers@ncsu.edu
Participation in collaborative project with UNC-CH using pigs as a model for studying ways to prevent atherosclerosis by treating them with antibodies that could reduce or prevent the formation of plaques in artery walls

Clay Clark
Associate Professor
Molecular and Structural Biochemistry
919-515-5805
clay_clark@ncsu.edu
Investigation of protein folding and the role of amino acid sequence identity in determining folding pathways of homologous proteins significant in a number of human diseases

Fred Gould
William Neal Reynolds Professor
Entomology
919-515-1647
fred_gould@ncsu.edu
Development of methods to suppress disease from dengue viruses based on use of transgenic strains of mosquitoes that can no longer transmit the virus to humans

Hosni Hassan
Professor
Microbiology
919-515-7081
hosni_hassan@ncsu.edu
Investigation of the global regulatory roles of redox and iron in metabolism and virulence of Salmonella to help in developing next generation of vaccines against Salmonellosis and other diseases; and development of engineered probiotic organisms for the delivery of antioxidant enzymes to the human gut for the treatment of inflammatory bowel diseases

Raquel Hernandez
Research Associate Professor
Molecular and Structural Biochemistry
919-515-5786
raquel_hernandez@ncsu.edu
Development of vaccines against four dengue virus serotypes as well as Chikungunya and West Nile viruses

Scott Kullman
Assistant Professor
Environmental and Molecular Toxicology
919-515-4378
swkullma@ncsu.edu
Research on the activity and regulation of drug and xenobiotic metabolizing enzymes, mechanisms of endocrine disruption as a modulatory factor in carcinogenesis, toxicogenomics and applied environmental toxicology

Scott Laster
Professor
Microbiology
919-515-7958
scott_laster@ncsu.edu
Research on the activity and regulation of drug and xenobiotic metabolizing enzymes, mechanisms of endocrine disruption as a modulatory factor in carcinogenesis, toxicogenomics and applied environmental toxicology
Examination of innate immunity to viral and bacterial pathogens and development of novel, plant-derived anti-microbial and anti-inflammatory compounds

Steven A. Lommet
William Neal Reynolds Professor
Assistant Vice Chancellor for Research
919-515-2717
steve_lommel@ncsu.edu

Using plant viruses as a nano-scale drug delivery vessel to targeted cell types

Marce Lorenzen
Assistant Professor
Entomology
919-513-7857
marce_lorenzen@ncsu.edu

Development of methods for suppressing disease from dengue viruses based on the use of transgenic strains of mosquitoes that can no longer transmit the virus to humans

Carla Mattos
Associate Professor
Molecular and Structural Biochemistry
919-513-2556
carla_mattos@ncsu.edu

Structural analysis of the complete binding surfaces of small monomeric GTPases, which is significant for understanding of basic mechanisms of normal Ras activation and oncogenesis

Stuart Maxwell
Professor
Molecular and Structural Biochemistry
919-515-5803
stu_maxwell@ncsu.edu

Understanding of synthesis, structure and function of the small nuclear RNAs that may allow design of potentially therapeutic molecules to regulate cell growth and development in human diseases

Trudy Mackay
William Neal Reynolds and Distinguished University Professor
Genetics
919-515-5810
trudy_mackay@ncsu.edu

If your home region has a hot, wet climate and lots of different kinds of birds and mammals, there’s a good chance it also contains numerous kinds of disease-causing pathogens.

A recent study examining the geography of human disease, led by Dr. Rob Dunn alongside an international team of biologists and social scientists, shows that one can predict the number of kinds of pathogens in a region just by knowing its climate or the number of birds and mammals found there.

Multiple things, Dunn says, might influence the diversity of pathogens in a region: human population size and density, the amount of time people have lived there or expenditures on disease control. Each of these undoubtedly has some influence, but the environment is dominant.

“We imagine that we have nature under control, but nobody seems to have told nature,” Dunn says. “The environment and, in its broadest sense, nature determine the number of kinds of diseases in different regions of the world in much the way that it has influenced the number of kinds of birds, mammals, ants or bees.

“On the one hand, we are not very effective at altering the numbers of kinds of pathogens present, as those numbers are strongly correlated with environmental conditions. The vagaries of climate and life over which we have little control determine which diseases you are at risk of contracting in any given place,” Dunn says. “But on the other hand, we can control the prevalence of pathogens by spending money on disease-control efforts. It is that prevalence that influences human health and well-being.”
Elucidation of genetic networks controlling behavior and metabolism using a Drosophila model (including projects related to alcohol sensitivity, aggression and metabolic disorder)

James Maheffey
Associate Professor
Genetics
919-515-5791
jim_mahaffey@ncsu.edu
Investigation of genetic control of body patterning

Laura Mathies
Assistant Professor
Genetics
919-515-7079
ldmathies@ncsu.edu
Dissection of the genetic control of stem cell development using a Caenorhabditis germ cell model to provide insights into how stem cells and progenitor cells are specified

Jennifer Miller
Assistant Professor
Microbiology
919-515-0723
jen_miller@ncsu.edu
Research on the interaction between the Lyme disease bacterium Borrelia burgdorferi and innate immune system and how these interactions contribute to the development of Lyme arthritis

Paul Mozdziak
Professor
Poultry Science
919-515-5544
pemozdzi@unity.ncsu.edu
Use of avian models for human ovarian cancer diagnostics, prevention and treatment

Dahlia Nielsen
Assistant Professor
Genetics
919-515-2586
dahlia@statgen.ncsu.edu
Genetic analysis of Plasmodium-host interaction using a mouse model to identify genetic factors contributing to susceptibility to malaria and how variation in the host can affect the adaptation by the parasite to the host immune system

Jun Ninomiya-Tsuji
Associate Professor
Environmental and Molecular Toxicology
919-513-1586
jtsuji@unity.ncsu.edu
Investigation of the molecular causes of ulcerative colitis and other inflammatory diseases

James Petite
Professor
Poultry Science
919-515-5389
j_petitte@ncsu.edu
Application of avian biotechnology to biomedicine and agriculture

Robert Petters
Professor
Animal Science
919-515-4021
bob_petters@ncsu.edu
Use of the pig as a genetic model of diseases affecting sight (retinitis pigmentosa, Stargardt's macular dystrophy and late-onset retinal degeneration) and determination of state of differentiation and potential uses of spermatogenic cells in infertility

Ian Petty
Professor
Microbiology
919-515-2393
tim_petty@ncsu.edu
Development of recombinant poxvirus-based vaccine platforms and discovery of antiviral drugs

Max Scott
Associate Professor
Genetics
919-515-0275
max_scott@ncsu.edu
Determination of how long-term learning and memory are controlled using a Drosophila model, with goal of identifying chromatin and gene expression changes required for maintaining long-term memories

Robert Rose
Assistant Professor
Molecular and Structural Biochemistry
919-513-4191
robert_rose@ncsu.edu
Research on the etiology of diseases, particularly diabetes, associated with misregulation of transcription

Coby Schal
Blanton J. Whitmire Distinguished Professor
Entomology
919-515-1821
coby_schal@ncsu.edu
Development, evaluation and demonstration of methods to control cockroaches and reduce their allergen production and isolation and characterization of compounds that attract bed bugs to human hosts and mediate egg-laying decisions in mosquitoes

Frank Scholle
Assistant Professor
Microbiology
919-513-7574
frank_scholle@ncsu.edu
Investigation of interactions of flaviviruses, which are involved in yellow, dengue and West Nile fevers, with host immune system, particularly the detection mechanisms that play dominant roles in establishing protective immunity

Michael Roe
William Neal Reynolds Professor
Entomology
919-515-4325
michael_roe@ncsu.edu
Development of delivery technologies for gene therapy, insect and tick repellents, biological herbicides based on natural products, novel transgenics for safe insect control and natural antiseptic lotions
Michael Sikes
Assistant Professor
Microbiology
919-515-7867
mike_sikes@ncsu.edu
Dissection of the epigenetic steps that guide the normal development of the immune system as well as their roles in the pathologies of immunodeficiency, autoimmunity and cancer

Robert Smart
Professor and Director of Graduate Programs
Environmental and Molecular Toxicology
919-515-7245
robert_smart@ncsu.edu
Investigation of gene-environment interactions that determine an individual's susceptibility to cancer

Eric Stone
Assistant Professor
Genetics
919-513-1221
eric_stone@ncsu.edu
Development of analytic tools to identify genetic networks controlling complex phenotypes; the new algorithms will have application to a variety of phenotypes and diseases and across organisms, including humans

David Threadgill
Professor and Department Head
Genetics
919-515-2292
threadgill@ncsu.edu
Identification of genetic factors contributing to differential cancer susceptibility and response to drugs and environmental contaminants

Paul Wollenzien
Professor
Molecular and Structural Biochemistry
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paul_wollenzien@ncsu.edu
Investigation of the structure and function of bacterial ribosomes

Geneticist’s mice studies yield human health solutions

Three different websites carry three different headlines: Eurekalert announces, “New paradigm identifies gene responsible for acetaminophen-induced liver injury.” Futurity.org covers the discovery of a “potent target for stopping colon cancer.” And Scientific American says, “To better study disease, mice that reflect human DNA diversity.”

Aside from their focus on human health, what do these headlines have in common? These scientific advances were all the result of research conducted by N.C. State University’s Dr. David Threadgill. Head of the Department of Genetics, Threadgill uses mice to investigate how people’s life histories and genetic makeups influence how susceptible they are to certain diseases and how differently they respond to medication.

Realizing that “real biology doesn’t function as a single gene, but it functions as entire networks of genes,” Threadgill focuses on complex interactions among genes and the environment.

And thanks to a seven-year breeding effort he helped lead, he now works with a pool of mice that is more genetically diverse — and thus more representative of human genetic differences — than the mice previously available to scientists.

His goal: personalized medicine that helps people understand more precisely how likely they are to develop given diseases and which drugs or lifestyle changes will work best for them.

“It sounds futuristic, but we are going to get there one day,” Threadgill says. “It’s just a matter of when.”
Economists and statisticians deepen our understanding of some of the most important human health problems. At N.C. State, they build better disease models, find better ways to run clinical trials for cancer treatments and help us understand economic aspects of important public health issues.

Marie Davidian
William Neal Reynolds Professor
Statistics
919-515-1928
davidian@stat.ncsu.edu

Longitudinal analysis and biostatistics, including research on ways to design and analyze data from cancer and HIV clinical trials; Summer Institute for Training in Biostatistics; and Integrated Biostatistical Training Program for Cardiovascular Disease Research

Ivan Kandilov
Assistant Professor
Agricultural and Resource Economics
919-513-3713
ivan_kandilov@ncsu.edu

Research on economic issues related to agricultural workers’ health insurance

Alison Motsinger-Reif
Assistant Professor
Statistics
919-515-3574
motsinger@stat.ncsu.edu

Research on computational genetics, pharmacogenetics and epistasis; development of methodology and software to detect complex, predictive disease models

Walter Thurman
William Neal Reynolds Professor
Agricultural and Resource Economics
919-515-4545
wally_thurman@ncsu.edu

Research on the economics of pollinators and pollination markets (which affect the price of a healthy diet)

Tom Vukina
Professor
Agricultural and Resource Economics
919-515-5864
tom_vukina@ncsu.edu

Research related to health insurance, particularly related to pricing of various health insurance options

Mike Walden
William Neal Reynolds Professor
Agricultural and Resource Economics
919-515-4671
mike_walden@ncsu.edu

Public education on consumer economics, including health-related topics

Mike Wohlgenant
William Neal Reynolds Professor
Agricultural and Resource Economics
919-515-4673
michael_wohlgenant@ncsu.edu

Quantifying the demand interrelationships for non-alcoholic beverages to find how consumers respond to incentives like taxes on soft drinks

Xiaoyong Zheng
Assistant Professor
Agricultural and Resource Economics
919-515-4543
xzheng@ncsu.edu

Research on farmers’ health insurance and access to health care and on nutrition assistance program participation and obesity of mothers and children
A sound environment is essential for human health. In the College of Agriculture and Life Sciences, most faculty members are, in some way, working to make the world a cleaner, healthier place. Here, we list just those faculty members who study human diseases related to the environment and those directly working to keep known human pathogens out of the environment.

Aziz Amoozegar
Professor
Soil Science
919-515-3967
aziz_amoozegar@ncsu.edu

Understanding decentralized wastewater treatment and the fate and transport of microbial and chemical pollutants from human and animal waste with goal of developing guidelines and techniques that make the land application of waste safer

Carl Crozier
Professor
Soil Science
252-793-4428
carl_crozier@ncsu.edu

Understanding the fate of raw manures, composts and novel products derived from animal wastes and accompanying management practices to protect environmental and human health

Owen Duckworth
Assistant Professor
Soil Science
919-513-1577
owen_duckworth@ncsu.edu

Understanding the fate and transport of microbial and chemical pollutants in...
land application of waste products; the bioavailability of metals from coal fly ash; and how biomolecules increase the solubility of toxic metals

Alexandria Graves
Assistant Professor
Soil Science
919-513-0635
alexandria_graves@ncsu.edu
Soil and environmental microbiology research, including using antibiotic-resistance genes to determine sources of fecal pollution in surface waters and groundwater

Amy Grunden
Associate Professor
Microbiology
919-513-4295
amy_grunden@ncsu.edu
Investigation of extremophile genes for bio-decontamination of toxic organophosphorus in some pesticides and chemical warfare agents and to improve stress resistance in crop plants such as tomato

Dean Hesterberg
Professor
Soil Science
919-513-3035
dean_hesterberg@ncsu.edu
Development of ways to prevent toxic and carcinogenic chemical contaminants from entering the human food chain and drinking water supplies and discovery of fundamental mechanisms of phosphorus binding in soils to protect water quality

Ernest Hodgson
Distinguished Professor Emeritus
Environmental and Molecular Toxicology
919-515-5295
ernest_hodgson@ncsu.edu
Investigation of human metabolism of xenobiotics

Mike Hoover
Professor
Soil Science
919.515.7305
mike_hoover@ncsu.edu
Development of small-scale water and wastewater reuse systems, field assessment of pathogen impacts of those systems and development of related national standards

Michael Hyman
Associate Professor and Director of Graduate Programs
Microbiology
919.515.7814
michael_hyman@ncsu.edu
Investigation of biodegradation of environmental pollutants such as chlorinated solvents and hydrocarbons such as crude oil and gasoline; many of the studied compounds are toxic to humans and are recognized or likely human carcinogens

Gerald LeBlanc
Professor and Department Head
Environmental and Molecular Toxicology
919-515-7404
ga_leblanc@ncsu.edu
Development and validation of models for evaluating the cumulative health effects of chemical mixtures in the environment

David Lindbo
Professor
Soil Science
919-515-2635
david_lindbo@ncsu.edu
Understanding decentralized wastewater management system functioning and the fate and transport of nutrients and microbial and chemical pollutants from land-applied biosolids to protect water quality

Scott McCulloch
Assistant Professor
Environmental and Molecular Toxicology
919-513-1214
scott_mcculloch@ncsu.edu
Investigation of the role of DNA polymerases in mutagenesis, specifically those mutations resulting from exposure to genotoxic insults

Deanna Osmond
Professor and Department Extension Leader
Soil Science
919.515.7303
deanna_osmond@ncsu.edu
Research and outreach to protect the environment and human health through agricultural practices that reduce pollutants

Heather Patisaul
Assistant Professor
Biology
919-513-7567
heather_patisaul@ncsu.edu
Examination of the steroid-dependent mechanisms through which sexually dimorphic behaviors and brain circuits arise and the mechanism by which sexually dimorphic systems and behaviors can be disrupted by environmental estrogens, particularly mechanisms by which exposure to estrogens can advance puberty and impair fertility in females

Michael Vepraskas
Professor
Soil Science
919-515-1458
michael_vepraskas@ncsu.edu
Research on climate change’s potential impact on septic systems; wetlands restoration for water quality; and fate and transport of microbial and chemical pollutants in land-applied waste disposal

Andrew Wallace
Assistant Professor
Environmental and Molecular Toxicology
919-515-8520
andrew_wallace@ncsu.edu
Investigation of the role of nuclear receptor signaling in human diseases of environmental etiology
CALS is North Carolina's leading provider of knowledge, education and technology related to food and nutrition. Our scientists breed crops for greater nutrition and create healthier food products such as sweet acidophilus milk and lower-fat cheeses. They also lead the way when it comes to research giving us a better understanding of human nutritional needs and what happens to the body when those needs aren't met.

Jose Alonso  
Associate Professor  
Genetics  
919-515-5729  
jmalonso@ncsu.edu  
Development of new genetic manipulation tools for rice that could facilitate rapid analysis of gene function and genetic manipulation that can be applied to improve crop production and nutrition.

Jose Bruno-Barcena  
Assistant Professor  
Microbiology  
919-513-1495  
jbbarcen@ncsu.edu  
Investigation of lactic acid bacteria physiology, genetics and bioprocessing and use of novel and genetically modified beta-galactosidases for producing prebiotics that more closely resemble human milk oligosaccharides.

Wendy Boss  
William Neal Reynolds Professor  
Plant Biology  
919-515-3544  
wendy_boss@ncsu.edu  
Improvement of human nutrition and health by using synthetic biology to redesign plants to increase their growth, nutritional quality and tolerance to stress; goals include reducing the presence of toxic compounds resulting from abiotic stress.

There's no denying that people need calcium for strong, healthy bones. But recent research from N.C. State suggests that not getting enough calcium in the earliest days of life could have a more profound, lifelong impact on bone health than previously thought. The researchers documented lower levels of bone density and strength in piglets fed a calcium-deficient diet. Not only that, but when they looked at certain stem cells in bone marrow, many of these cells appeared to already have been programmed to become fat cells instead of bone-forming cells.

Because the cells replicate to provide all the bone-forming cells for an animal's entire life, very early calcium deficiency may have predisposed the piglets to have bones that contain more fat and less mineral.

That could make the pigs more prone to osteoporosis and obesity in later life, said Dr. Chad Stahl (above, center), an associate professor of animal science.

“For me,” Stahl said, “the biggest message is that calcium nutrition, or mineral nutrition as a whole, needs to be a priority from day one. Early life nutrition is setting children up physiologically for the rest of their lives.”

Margo Daub  
William Neal Reynolds Professor and Department Head  
Plant Biology  
919-513-3807  
margaret_daub@ncsu.edu  
Development of new genetic manipulation tools for rice that could facilitate rapid analysis of gene function and genetic manipulation that can be applied to improve crop production and nutrition.
Investigation of the biosynthetic pathway for vitamin B6 in plants with a goal of increasing vitamin and antioxidant content
Chris Daubert
Professor and Undergraduate Coordinator, Bioprocessing Science
Food, Bioprocessing and Nutrition Sciences
919-513-2092
chris_daubert@ncsu.edu

Development of new modified whey protein ingredient to create a yogurt-like product with added prebiotics and probiotics
Charlotte Farin
Professor
Animal Science
919-515-4022
char_farin@ncsu.edu

Participation in collaborative Haiti Fish and Goat Development Project with the University of Florida to provide animal-source food to children, improve livestock genetics and support training of Haitian farmers interested in goat and fish farming
Allen Foegeding
William Neal Reynolds Professor
Food, Bioprocessing and Nutrition Sciences
919-513-2244
allen_foegeding@ncsu.edu

Development of ways to reduce fat and increase the content of high-quality protein in cheese
Sung Woo Kim
Associate Professor
Animal Science
919-513-1494
sungwoo_kim@ncsu.edu

Investigation of nutrition and digestive physiology, including nutrition during pregnancy and lactation, and of pigs as a model for human nutrition
Todd Klaenhammer
University Distinguished Professor
Food, Bioprocessing and Nutrition Sciences
919-515-2972
klaenhammer@ncsu.edu

Investigation of functional genomics of probiotic Lactobacilli to link specific genes to traits responsible for health benefits of probiotic cultures and of oral delivery of biotherapeutics via probiotic lactic acid bacteria
Tyre Lanier
Professor
Food, Bioprocessing and Nutrition Sciences
919-513-2094
tyre@unity.ncsu.edu

Research on sodium reduction in injected meats and enhanced omega 3 levels in surimi seafoods
Jack Odle
Professor
Animal Science
919-515-6884
jack_odle@ncsu.edu

Research on human neonatal nutrition using pigs as a model and on enhancing human neonatal intestinal growth, development and repair following injury
Kenneth Pecota
Researcher
Horticultural Science
919-515-1205
ken_pecota@ncsu.edu

Sweetpotato breeding and genetics, including new varieties with high antioxidant and free-radical scavenging activity and cultivars with higher dry matter and multiple disease resistance to address vitamin A deficiencies in East Africa
Niki Robertson
Professor
Plant Biology
919-513-1901
mrojasp@ncsu.edu

Understanding mechanisms of membrane protein trafficking in the plant vacuole, which has implications for human nutrition, and changes in the localization of vacuolar proteins during environmental stresses
Bryon Sosinski
Associate Professor
Horticultural Science
919-513-3883
bryon_sosinski@ncsu.edu

Research into the genetics and genomics of important horticultural traits, including higher dry matter and multiple disease resistance to address vitamin A deficiencies in East Africa
Chad Stahl
Associate Professor
Animal Science
919-513-1512
chad_stahl@ncsu.edu

Investigation of the interactions between nutrition and genetics, with an emphasis on bone health, and the development of novel protein-based antimicrobials and recombinant protein expression systems
Lin Xi
Research Assistant Professor
Animal Science
919-515-4014
lin_xi@ncsu.edu

Research to improve human neonatal nutrition using pigs as a model
Craig Yencho
Professor
Horticultural Science
919-513-7417
craig_yencho@ncsu.edu

Sweetpotato and potato breeding and genetics, including new sweetpotato cultivars with high antioxidant and free-radical scavenging activity and cultivars with higher dry matter and disease resistance to address vitamin A deficiencies in East Africa
An estimated 76 million cases of foodborne disease occur each year in the United States, and while most are mild, 325,000 hospitalizations and 5,000 deaths occur. At NC State, our researchers and extension educators work from farm to fork to reduce risk. Our programs reach the public, food servers, food preparers, food processors and farmers.

**Kenneth Anderson**  
Extension Specialist  
Poultry Science  
919-515-5527  
ken_anderson@ncsu.edu  
*Investigation of the colonization of poultry by the food-borne pathogen Salmonella enteritidis and potential for transmission to the egg*

**Fletcher Arritt**  
Assistant Professor and Poultry and Food Processing Extension Specialist  
Food, Bioprocessing and Nutrition Sciences  
919-513-0176  
fmarritt@ncsu.edu  
*Development of food-safety training for health inspectors, meat and poultry processors and acidified food entrepreneurs*

**John Brake**  
William Neal Reynolds Professor  
Poultry Science  
919-515-5060  
john_brake@ncsu.edu  
*Research on the effect of transgenic corn on broiler chicken performance to ensure new strains are safe for human consumption; feed formulations to protect soil and water from phosphorus excretion; and systems to reduce ammonia emissions*

When Ben Chapman arrived at N.C. State University in 2009 as the new food-safety specialist, he hit the ground running. Salmonella had been discovered in peanut butter products distributed from a Georgia peanut processor, and Cooperative Extension agents around the state were getting questions about which peanut butter products were safe to eat and which were not.

Chapman was uniquely positioned to obtain the latest information on the crisis and provide it to the field. He’s been involved in a number of projects, including updating agents on news regarding the Salmonella outbreak in peanuts, working with the Fresh Produce Safety Task Force, launching the food-safety component of Family and Consumer Sciences’ Cook Smart, Eat Smart curriculum and offering food preservation training to Extension agents.

Chapman focuses on finding the best ways to communicate food safety risk to the people who need to know. He is interested in how social media like Facebook and rapid communication technologies like Twitter might improve public safety around the issue of food risk.

Chapman developed food-safety info-sheets (www.foodsafetyinfosheets.com), one-page web-based fact sheets with information about the consequences of poor food handling practices — how they can lead to illnesses, destroy business reputations and result in lawsuits.

Ideally, he would like to see a widespread “food safety culture” that would include the entire farm-to-fork continuum — from farmers’ markets to church dinners; from farms to restaurants.

**Educator provides food-safety facts to those who need to know**
Research on food safety and security associated with acid and acidified food and development of methods to prevent growth and survival of pathogenic and spoilage microorganisms in minimally preserved, brined and fresh-cut foods.

Extension education programs related to food-safety issues of eggs and poultry.

Development of food-safety education programs for consumers, the media and the retail, food service and fresh produce industries.

Development of rapid analytical techniques for monitoring the safety and quality of aquatic foods (molecular techniques for detecting and quantifying toxigenic histamine producing bacteria in fish).

Identification and characterization of factors that allow for the transmission and carriage of Campylobacter jejuni, a cause of common bacterial food poisoning, in the food supply, particularly in poultry and swine.

Development of control strategies for aflatoxin, a naturally occurring mycotoxin that is among the most carcinogenic substances known.

Application of molecular biology and genomics techniques to the study of the ecology, physiology and interactions between yeasts and bacteria relevant to fermentation and food safety.

Research on marination of poultry meat with high levels of phosphate to reduce Salmonella, a food-borne pathogen.

Investigation of functional genomics and pathogenesis of Campylobacter species important to human and animal health.
North Carolina Cooperative Extension is the go-to source for educational programs helping people make good choices about nutrition and physical activity. Our extension educators reach all ages, from preschoolers to seniors, in all 100 North Carolina counties. Their local foods initiatives help connect consumers who need fruits, vegetables and other foods with local farmers who need the income. Extension also works to end hunger by helping families learn food buying and preparation strategies to stretch their food dollars.

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Coordination of FitFactor, an Air Force youth fitness program encouraging physical activity and healthy eating

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Coordination of Supplemental Nutrition Assistance Program (SNAP-Ed) Steps to Health Program for older adults in congregate nutrition sites and third graders in low-income schools

Hunger, Obesity and Nutrition Education

Program helps participants eat smart, move more and weigh less

More than 65 percent of all N.C. adults are overweight, and our state ranks fifth worst in the country for childhood obesity. Cooperative Extension is out to change these statistics through its Eat Smart, Move More, Weigh Less program.

The 15-week program helps people plan, track and live healthier lifestyles. A team of experts with Extension and the N.C. Division of Public Health developed the program.

Dr. Carolyn Dunn, a family and consumer sciences professor, said three things stood out in the team’s research on what helps people achieve and maintain a healthy weight: planning, tracking and being mindful about food and physical activity.

ESMMWL has been implemented in different ways throughout the state. Wayne County’s Fit and Fabulous for 15 Program is a good example. Each week, local experts teach nutrition, and twice a week a fitness instructor conducts exercise classes. The program, organized by Extension and the county Health Department, has been such a hit that there’s a long waiting list.

Participants came from all walks of life, from school students to retirees, said extension agent Christine Smith. “We try to make it fun and light, so that everybody can feel like they are achieving something. And they feel good as a result of doing that.”

With weight loss ranging from 2 to more than 25 pounds, participants made big steps toward healthier lifestyles. Some reported being able to cut back on diabetes medication, gaining control of high blood pressure and making healthier food choices.
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Research and extension education to increase North Carolinians’ access to fresh fruits and vegetables, particularly among consumers lacking food security

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Coordination of statewide extension youth Expanded Food and Nutrition Education Program (EFNEP), which reaches about 14,000 low-income young people each year

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Development of extension education programs related to child nutrition, physical activity and women’s wellness, including the Eat Smart, Move More, Weigh Less and Color Me Healthy programs

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Coordination of the statewide Expanded Food and Nutrition Education Program (EFNEP), which involves nine professional staff members in the Department of 4-H Youth Development and Family and Consumer Sciences and 69 paraprofessionals in 54 counties

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Development of extension education programs related to adult nutrition and diet-related chronic diseases, including heart disease, diabetes and osteoporosis

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Coordination with East Carolina University on Take Off 4-Health, a summer camp for morbidly obese teenagers

Garden plants seeds of better nutrition, physical activity

Helping people learn how to eat well and to grow nutritious fresh vegetables and fruits was the goal of an award-winning Cooperative Extension community garden project in Beaufort County. Close to 150 people used the garden, while 85 third-graders had the chance to spend a day in the garden at the end of a nine-session Steps to Health program designed to increase their physical activity and overall nutrition.
Plants can serve as a source not only of nutrients but also of compounds that protect and enhance human health. These so-called secondary compounds — phytochemicals that aren't directly involved in a plant's normal growth, development or reproduction — help the plants protect and defend themselves and attract pollinators. When eaten, they can yield health benefits for the consumer. College scientists search for and identify such plant components in North Carolina and around the globe. Also, through integrated research in metabolomics, biochemistry, pharmacogenomics, breeding and postharvest technology, they work to improve fruit and vegetable crops to counteract human disease, fight fatigue and enhance strength.

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Muscadine grape breeding and evaluation for phenolic content and antioxidant activity, as well as other health benefits and quality traits

Allan Brown
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From Bhutan's rugged Himalayas to Ecuador's cloud forest to Alaska's frozen tundra, Dr. Mary Ann Lila searches high and low for what could be called pharmaceutical plants — and not the brick-and-mortar kind that make medicines. She seeks the leafy kind, full of chemical compounds that can stave off human disease, promote endurance and strength, improve metabolism and erase signs of aging.

Lila works from the N.C. Research Campus in Kannapolis, where she directs N.C. State University's Plants for Human Health Institute. The institute strives to shift the way the American public views and uses plant food crops as sources not just for nutrients but also for phytochemicals that protect and enhance human health.

Lila's current research involves health-enhancing compounds in blueberries and other berries, phytochemicals that counteract malaria, and the search for natural products with biomedical uses. The latter is part of the Global Institute for BioExploration, or GIBEX, a partnership of NC State and Rutgers universities and the University of Illinois at Urbana-Champaign.

GIBEX works with scientists, students and traditional healers in developing nations and with Native Americans to identify plants that hold promise for human health. It trains and equips local scientists with cost-effective drug-discovery tools and technologies that are portable and easy to use. That way, discoveries can be made in the field, with the intellectual property remaining with the local population.

“What we are really doing,” Lila says, “is putting some substance behind what your grandmother always told you.”
Investigation of the genetics and stability of secondary metabolites in fruits and vegetables that have known health effects.

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Development of methods for analyzing the active principles in phyto-pharmaceutical crops; protocols for the germination, propagation and agronomic production of these plants; and nutraceuticals from tobacco.

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Research and education programs related to the cultivation of native woodland botanicals with medicinal properties.

Lisa Dean
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Examination of peanut skins as source of natural antioxidant compounds for human health.

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Evaluation of the antioxidant and anti-inflammatory properties of bio-available phenolic compounds in grape cultivars.

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Investigation of functional properties of plant foods, including the antioxidant and anti-inflammatory effects of flavonoids and related compounds.

Mary Ann Lila
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Discovery and pre-clinical characterization of bioactive plant compounds with benefits for human health (hypoglycemic and adaptogenic properties and prophylaxis against malaria).

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Development of N.C. Medicinal Germplasm Repository at the N.C. Arboretum.

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Tomato breeding, including evaluating for content of lycopene, an antioxidant with anti-cancer properties.

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Post-harvest research into the quality and nutritional value of fruit and vegetable crops (lutein and citrulline in cucumber, antioxidant content of blackberry and raspberry and carotenoid profile of tomato and watermelon).

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Evaluation of the antioxidant and anti-inflammatory properties of bio-available phenolic compounds in grape cultivars.

Todd Wehner
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Breeding watermelon for high lycopene, prolycopene and citrulline content; cantaloupe for resistance to food-borne pathogens; and cucumber for high lutein content.

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Isolation, structural identification, biosynthesis and metabolic engineering of plant flavonoids from medicinal plants and crops, including Artemisia annua for antimalarial drug; and finding sources for protection against and treatment of aging diseases and cancer.
When it comes to the future of health care in North Carolina, nothing matters more than preparing the people who will lead the way. CALS’ efforts touch people even before they get to college: Our 4-H youth development program introduces children of all ages to the fourth H — health — through projects, workshops and community service.

The College also offers several undergraduate degree programs and advising services that prepare students for medical, dental and pharmacy schools, as well as for related careers in nutrition, genetics, bioprocessing, life sciences research and more.

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Preparation of Health Leaders

The path to a health-care career can start at NC State

For some, the realization comes early in life that they aspire to a career caring for the health of others; they simply know how they want to spend their lives. Others, after considerable deliberation, decide later in life to pursue a health-care career. No matter. Once the path is chosen, it must of necessity include a solid grounding in science.

CALS has long provided that grounding for those who wish to pursue post-graduate education for careers in human medicine, nursing, dentistry, optometry, pharmacy or physical therapy. CALS has historically offered strong undergraduate programs in disciplines such as biochemistry, biology, genetics, microbiology and zoology.

CALS also works with students and alumni to help ensure that graduates are accepted to post-graduate programs. That effort begins with Dr. Anita Flick, who directs CALS’ Health Professions Advising Center or Health PAC. The number of students served by Health PAC has risen steadily since the program was started in 2006. The program now works with about 5,000 students and alumni annually.

How do students who take advantage of Health PAC fare when applying to medical schools? Each year, about 500 students who have made use of Health PAC guidance apply to post-graduate health-care related programs. Close to 85 percent of students who use the Health PAC process and receive the highest recommendation or are recommended without reservation are admitted to medical school. That 85 percent acceptance rate compares to an acceptance rate of roughly 40 percent for all N.C. State University students who apply to medical school and for students nationally who apply.

Clearly, Health PAC works.
CALS experience expands horizons for aspiring medical researcher

As he pursues his dream of helping stop the AIDS epidemic that killed one of his young cousins, New Orleans native Odell Isaac intends to see as much of the world as he can. Twice, his journey has landed him at N.C. State University, where he’s had the chance to meet with some of the College of Agriculture and Life Sciences’ leading scientists and to spend 10 weeks conducting complicated genetic research with one of them.

A senior at Xavier University, Isaac made his first trip to Raleigh in November 2009 as part of a new project called CHAMPS, or Cultivating High-Achieving, Motivated Professionals and Scholars. He came back in summer 2010 to conduct research in Dr. Linda Hanley-Bowdoin’s lab in the departments of Genetics and of Molecular and Structural Biochemistry. He came as part of the Synthetic Biology Undergraduate Research Experience run by NC State’s Biotechnology Program and the Department of Plant Biology under the direction of Dr. Sue Carson.

The National Science Foundation-funded research experience exposes selected students to ways of using biotechnology to turn plants into factories that generate useful products, such as pharmaceuticals, and to develop synthetic model systems for studying fundamental biological mechanisms.

While Isaac hasn’t yet decided where to pursue his graduate education – he hopes to get a Ph.D. in immunology or virology and an M.D. in infectious diseases – he said CHAMPS and the synthetic biology program “opened me up to new horizons. It was a chance to get away from home and to open myself up to new experiences.”

Development of interdisciplinary summer course on community food security; the course includes community service components

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Development of student service-learning and volunteer projects related to nutrition education and research on motivating parents to promote calcium intake among early adolescents and on parent-child mealtime interactions and obesity
4-H’ers take action to stop hidden health problem of hunger

4-H’ers across the state are working together to collect 1 million pounds of food for the state’s food banks. Called Hungry to Help, the campaign promotes awareness of hunger in North Carolina and efforts to stop it.

To get the campaign started during the annual State 4-H Congress in Raleigh, 350 4-H’ers spent one morning repackaging 37,900 pounds of pasta from massive containers into smaller, family-sized portions for the state’s food banks.

Speaking at a banquet the previous night, Clyde Fitzgerald of the Second Harvest Food Bank of North Carolina told the 4-H’ers that hunger is a serious health problem and that those who think hunger isn’t a problem here are mistaken.

He cited figures from a 2009 analysis by Feeding America that showed that North Carolina ranks as the second-worst state in the nation when it comes to children under 5 lacking regular access to nutritious food and as 10th-worst for children of all ages.

“There’s nothing more basic than the need for food,” Fitzgerald said. “A child that is not well fed cannot be as healthy as other children.” Nor, he added, can hungry children reach their full potential.

State 4-H Leader Dr. Marshall Stewart challenged 4-H’ers to bring Fitzgerald’s message back home to their communities, to raise local awareness and to become citizen leaders for hunger relief.

4-H’er Meagan Briley of Pitt County was among those eager to pitch in. “4-H encourages us to care about our communities and the quality of life of people around you,” she said. “Hungry to Help gives us something that can bring us together and that can allow us to make a real difference.”
In addition to our work related to health, the College of Agriculture and Life Sciences also has varied research and extension programs designed to improve people’s well-being in North Carolina and beyond. Because agriculture is one of the most dangerous occupations, we have a longstanding agromedicine partnership with East Carolina University. We also have specialists who are experts in parenting, aging, child development, relationships, family financial management, and health and safety in the home.

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Development and testing of a healthy relationship and marriage extension education project and outreach programs related to child development and parenting

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Leadership for North Carolina Cooperative Extension’s involvement in the Powerful Tools for Caregiving partnership and Living Healthy (Stanford’s Chronic Disease Self-Management Program)

Recognizing that farming is among the nation’s most hazardous occupations, North Carolina Cooperative Extension offers educational programs to help farmers, farmworkers and their families lower their risks of injury, illness and death. Our latest tool in this effort: a kit of easy-to-use materials to teach pesticide safety to Spanish-speaking agricultural workers with limited formal education.

Extension tested the kit with workers and trainers to make sure it was simple yet effective. The U.S. Environmental Protection Agency also reviewed the materials.

The centerpieces of the new kit are tabletop flipcharts. Lesson plans appear on the side that faces the trainer, while the side that faces the audience features colorful photographs illustrating the trainer’s message.

The kit also comes with one-page illustrated sheets — available in Spanish and English — related to some of North Carolina’s most important crops. The sheets list common pesticides used at various stages of crop growth, indicate each pesticide’s toxicity level and spell out how long areas treated by each pesticide should be off-limits. They also have realistic drawings illustrating the symptoms a worker might experience because of unsafe exposure and phone numbers for the worker to call in case of problems.

Dr. Greg Cope, Julia Storm and Catherine LeProvost with the Department of Environmental and Molecular Toxicology developed the kit. They plan to launch a related website in the summer of 2010 for tobacco, sweetpotato and tomato crops, and they have materials related to eight other crops in the works.
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Development and testing of a healthy relationship and marriage education training project and of Spanish-language educational materials related to health and safety

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Involved with the Seniors Health Insurance Information Program, Medicare Part D Program and Rural Families Speak About Health project to assess factors affecting rural family health and well-being

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Coordination of university agromedicine program to protect the safety and health of North Carolina's farmers

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Participation in the North Carolina Healthy Homes Partnership, which improves the health and safety of children and their caregivers by reducing housing hazards that cause injury and disease

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Piloting AgriSafe of North Carolina and Certified Safe Farm of North Carolina to protect the health and safety of North Carolina's farmers

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Research on caregivers of people with severe and persistent mental illness and development of a culturally sensitive health literacy toolkit for sexually transmitted infections for the African-American community

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Research using the Japanese quail as a model for human mechanisms generating daily (circadian) and seasonal rhythms

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Development of extension education programs related to environmental health and housing and of a healthy homes training center
NC State University is dedicated to equality of opportunity. The University does not condone discrimination against students, employees, or applicants in any form. NC State commits itself to positive action to secure equal opportunity regardless of race, color, creed, national origin, religion, sex, age, or disability. In addition, NC State welcomes all persons without regard to sexual orientation.