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Making a Difference Through Innovative Research

MOVING DISCOVERY-BASED LABORATORY RESEARCH INTO THE REAL WORLD TO HELP SOLVE REAL WORLD PROBLEMS
Dear Friends,

As I write this letter, the University of Tennessee has just completed its search for a new president, choosing me from among a talented pool of candidates. For me, it’s a humbling and bittersweet moment. I’m very excited about the challenges that lie ahead and pledge to do my utmost to make everyone proud. At the same time, my wife Deb and I will miss our close contact with everyone who helps make the Institute of Agriculture so great and so dynamic.

I’m confident that the institute is headed in the right direction, with much in which to be proud—in academics, research and outreach. We’re thriving in our land-grant mission, as articles in this issue of our magazine attest. I promise to keep a watchful eye on future institute successes and am committed in my next role to helping the institute achieve even more.

UT as a whole, also, has never been better. It’s a great time to be at Tennessee and to be a part of this university as a student, faculty and staff member, alumnus or donor. I urge you to keep your connections to us close and keep your ideas, suggestions and support coming as we work to move the university, its programs, passion and people ahead.

All the best,

Dr. Joseph A. DiPietro
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NEW APPOINTMENTS

At the June meeting of the University of Tennessee Board of Trustees, the full board revised the university’s bylaws to change the title of vice president of agriculture to chancellor of the UT Institute of Agriculture. This new title clarifies the role of the Institute of Agriculture’s chief officer, Dr. Joseph A. DiPietro, in academic and tenure decisions. The position will continue to report directly to the UT president.

Internationally renowned mastitis researcher Dr. Stephen Oliver is now serving as assistant dean for research and assistant director for UT AgResearch. His area of focus is to advance grantsmanship, publications and intellectual property work by institute scientists. See article on page eight. Dr. John Hodges, longtime director of the East Tennessee AgResearch and Education Center, now oversees infrastructure and maintenance for AgResearch, and Dr. Bobby Simpson now directs the East Tennessee AgResearch and Education Center.

Dr. Robert Burns, a former faculty member in the Department of Biosystems Engineering and Soil Science has returned from an Extension appointment at Iowa State University to serve as UT Extension’s new assistant dean for agriculture, natural resources and resource development. Dr. Ben West of Mississippi State University is now serving as Extension leader for the Western Region.

The institute now has a third new assistant dean, with Dr. William Park of the Department of Agricultural and Resource Economics serving as interim assistant dean of the College of Agricultural Sciences and Natural Resources. He succeeds Dr. Mary Albrecht, who accepted the role of associate vice chancellor to guide UT Knoxville in its quest to become a top 25-ranked university. She is also working on the Southern Association of Colleges and Schools reaccreditation process—both top initiatives for the university.

The University of Tennessee Plant Sciences Department is increasing its research, outreach and educational capabilities in the area of sustainability with the addition of two faculty members: Dr. David Butler and Dr. Amy Fulcher. “We are pleased and excited to have David and Amy’s expertise in the department to address critical needs of society in the areas of agricultural and landscape stewardship, alternative cropping and environmental sustainability,” says Robert Augé, head of the Department of Plant Sciences. —Erica Jenkins

Dr. Mary Albrecht  Dr. Robert Burns  Dr. Stephen Oliver  Dr. William Park
HOLLY WONDERFUL

This summer the Elmore Holly Collection was dedicated at the UT Forest Resources AgResearch and Education Center. Twenty-six members of the Elmore family attended to join in recognizing the late Harold “Mr. Holly” Lane Elmore and his vision and dedication for forming what has become a research and display garden of over 200 cultivars of the genus Ilex at the UT Arboretum in Oak Ridge, Tennessee. Under the direction of a brick mason, members of the UT Arboretum Society built the natural stone entrance.

NEW NAMES

Reflecting its growth and broadened scope, the Department of Agricultural Economics is now the Department of Agricultural and Resource Economics. The College of Veterinary Medicine’s Veterinary Teaching Hospital is now known as the UT Veterinary Medical Center. Ag Econ now grants degrees with majors in areas of food and agricultural business or natural resource and environmental economics. The VMC is a major medical center composed of experts in nearly every specialty area of veterinary medicine who are backed by basic and clinical scientists advancing the understanding of health and disease.

SHOW YOUR 4-H SPIRIT

Tennessee 4-H Alumni Inc., is pleased to offer a new 4-H limited edition print for 2010. The painting illustrates the hands-on learning, leadership experience and volunteer spirit within all of the 4-H project areas. The original watercolor is by UTIA Publications Specialist Rich Maxey. For information, visit http://4hfoundation.tennessee.edu/Print/PrintOrder.html.

YOUNG SCIENTISTS

Undergraduate and veterinary medicine students from a number of universities spent last summer collaborating with three institute scientists in advanced scientific work through the National Institute of Mathematics and Biological Sciences, or NIMBioS. In Dr. Kimberly Gwinn’s plant pathology lab (pictured), Réka Kelemen, Dubravka Bodiroga and Luong Nguyen modeled effects of bioactive natural products from bee-balm (Monarda didyma) on the beneficial fungus, Beauveria bassiana. Also mentoring students was Dr. John New of Comparative Medicine in the College of Veterinary Medicine and Dr. Shigetoshi Eda of Forestry, Wildlife and Fisheries. Dr. Graham Hickling of the Center for Wildlife Health (page 15) serves as associate director of the UT Knoxville program. Primary goals of NIMBioS are to foster the maturation of cross-disciplinary approaches in mathematical biology and the development of a cadre of researchers who are capable of conceiving and engaging in creative and collaborative connections across disciplines to address fundamental and applied biological questions.
UT GARDENS PARTNERS WITH UT CULINARY INSTITUTE ON HERB AND BERRY GARDEN

Last fall, UT Gardens student interns planted an herb and berry garden for the UT Culinary Institute as a part of a growing collaboration between the two organizations. The garden will provide hands-on learning for students in both programs for seasons to come.

Having the garden right outside the Culinary Institute’s teaching facility adds to the culinary experience and provides dynamic learning for many students who have never experienced growing and using their own herbs in cooking.

Dr. Sue Hamilton, director of the UT Gardens and Dr. John Antun, founding director of the Culinary Institute, worked together to design the garden and define the needs of students studying in each program. The Herb and Berry Garden includes blueberries; raspberries; blackberries; assorted varieties of basil, sage, thyme, rosemary, dill, fennel and chives; and unusual herbs used in the culinary arts.

Like the plants, the collaboration that began a year ago has flourished. Antun has presented culinary workshops at the UT Gardens Blooms Days garden festival and uses produce from the Kitchen Garden in his classes. Hamilton and Antun continue to seek ways the two organizations can partner to advance teaching, research and outreach.

—James Newburn

THE HELPING HANDS KITCHEN AND ENABLING LEARNING GARDEN

If you visit the UT Gardens in Knoxville, one of the first things you might notice is a Barney-purple, fenced-in area. It’s the new Helping Hands Kitchen and Enabling Learning Garden. Divided into two sections, the larger side encompasses a standard vegetable garden with raised beds to facilitate weed control and hold good soil. Cold frames will extend the growing season for cool-season crops as well as the small fruit trees and berry shrubs around the perimeter of the fence. Several tool sheds with rain barrels connected to them serve as water conservation examples.

Seating areas for teaching and demonstrations detailing best practices for growing fruits and vegetables and preparing them for the table are also included in the garden. Dr. Annette Wszelaki, assistant professor and UT Extension vegetable specialist, is proving UT Gardens with expert advice. The Kitchen Garden is a demonstration site for sustainable gardening practices, including composting, crop rotation, companion planting for pest management, cover cropping and water catchment.

In addition, Dr. John Antun, UT Culinary Institute director, purchased produce from the garden for his teaching facility. The remaining harvest was sold at the first annual UT Gardens Farm Market, a weekly event held this spring and fall on the agriculture campus.

The other side of the garden includes vegetables and herbs. It showcases adaptive features that allow those with limited mobility or developmental difficulties to participate in gardening. Features include vertical gardening, tabletop gardening for wheelchair-bound individuals, and planters with bench-type seating.
Holiday Express at the UT Gardens, a garden-scale railroad display, will delight visitors of all ages beginning November 24 and running through January 2, 2011.

New this year will be a bridge that will enable visitors to walk through the display and get a close up look at the miniature configurations and all the detail that makes the Holiday Express such an amazing and unique experience.

Holiday Express features 12 garden-scale model trains, thousands of lights and a miniature landscape featuring rivers, waterfalls and more than 100 buildings. The trains run simultaneously on a quarter-mile track that winds through the fictional town of Ravensford. Visitors marvel at the elaborate landscape, which includes replicas of existing East Tennessee architecture.

“Children and adults alike are assured an educational and fun time as they explore many of the railroad antiquities on display, many of which are interactive, along with the incredible holiday scene that garden railroading expert Mark Fuhrman creates.”

Fuhrman, a Knoxville-based landscaper and garden-scale model train enthusiast, customizes each train car and building by hand with a passion and care that has resulted in one of the largest train collections in East Tennessee.

Now in its third year, Holiday Express draws about 9,000 visitors to the UT Gardens. We hope you’ll join us this year. —Lorna Norwood

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**Thanksgiving Weekend:**
November 24-27 . . . . . 12 p.m. to 8 p.m.
November 28 . . . . . . . . 12 p.m. to 6 p.m.

**December 4-January 2:**
Friday & Saturday . . . . 12 p.m. to 8 p.m.
Sunday . . . . . . . . . . 12 p.m. to 6 p.m.
December 24 & 25
Christmas Eve & Day . . . . 12 p.m. to 6 p.m.
Land-grant universities were founded to improve the lives of citizens in their states, the nation and world. UT scientists have delivered on that mission from the earliest days of the university to the present, developing new knowledge and disseminating it to the public as expeditiously as possible. The way that new knowledge generated by UT AgResearch scientists is delivered is changing, though, as researchers place more emphasis on generation of intellectual property that is patented or licensed to allow vested partners to use and commercialize to quicken the pace in which results become available to the general public.

AgResearch scientists are major players in intellectual property invention disclosures within the UT system. In the past 18 months, four patents have been issued, 27 patent applications have been filed and 43 invention disclosures have been documented. And the number of those discoveries continues to accelerate as UTIA scientists conduct cutting edge research that results in new scientific breakthroughs and development of new and unique applications of knowledge.

“We’re seeing achievements in agriculture and food systems, bio-based energy and natural resource management, health, family and community sciences,” says Dr. Steve Oliver, a world-renowned mastitis researcher who now coordinates the Institute’s intellectual property work as assistant dean for research and assistant director of AgResearch.

To facilitate this discovery work, AgResearch has partnered with the UT Research Foundation to add a technology transfer specialist fully dedicated to facilitating intellectual property development by UTIA scientists.

“For us, it’s not just the invention that’s important, it’s the problem we’re trying to solve and, if we’re successful, the magnitude of the impact we’ll have,” Oliver notes. “The bottom line in this business is we don’t know the answers to complex problems until we do the research.”

Specific achievements since 2009 include the following patents:

METHOD FOR DIAGNOSING INFECTIONS, Drs. Shigetoshi Eda and C. A. Speer

Early and accurate diagnosis of infectious disease is important for successful treatment of the disease in humans and animals. The patented diagnostic method detected infectious diseases in animals earlier than currently available methods with high accuracy. This research began in studies to detect Johne’s disease (JD) in wild and domesticated ruminants; however, the patent it yielded covers the use of the method for diagnosis of any infectious diseases. The Center for Wildlife Health Laboratory has developed revolutionary new diagnostic tests for JD – a bacterial disease of livestock.

“OUR new diagnostic tests for JD are more than 95 percent sensitive, whereas current serological JD tests are less than 30 percent sensitive. The patents on our two methods cover their application to diagnostic tests for any disease caused by microorganisms. We see a great opportunity for applying these technologies to the development of diagnostic tests for human and animal infectious diseases other than JD,” Eda says.

STREPTOCOCCUS UBERIS ADHESION MOLECULE, Drs. Stephen Oliver, Raul Almeida, Douglas Luther and Hee-Myung Park

Mastitis is a complex multifactor disease that affects dairy cows worldwide causing billions of dollars in losses. Mastitis caused by environmental pathogens such as Streptococcus uberis is particularly problematic because current methods of control are less effective, often ineffective, against this pathogen. Dr. Oliver’s research focuses extensively on discovery of nonantibiotic approaches for the prevention and control of environmental mastitis in dairy cows. Results of studies aimed at development of new vaccines against environmental mastitis pathogens that are resistant to current methods of mastitis control are likely to have huge payoffs as use of antibiotics in the dairy industry comes under greater scrutiny by federal regulatory agencies. The discovered molecule, a culmination of a decade of work, may prove instrumental in achieving resistance to mastitis through the development of a mastitis vaccine. Signaling the importance of this work, patents have been granted in the U.S., New Zealand, Australia, Israel and Mexico with patents pending in the European Union, Canada and Brazil.

EMBRYO DEVELOPMENT AND SURVIVAL, Dr. Neal Schrick

DISCOVERED through pioneering bench science and testing in cattle at UT AgResearch and Education Centers, this patent relates to the addition of...
Embryo Armor™ to fluid used to collect embryos from cows. This increases the likelihood that pregnancy will occur when those embryos are transferred into recipients or surrogates. The patent covers the addition of Embryo Armor to any collection or culture media that an embryo may reside in for a short period of time as well as for use in humans and all other mammalian species.

**PLANT UTILITY PATENT FOR USG ALLEN, Drs. Vince Pantalone, Fred Allen and Debbie Ellis**

A maturity group V bean named Allen performed so well in the field that it ranked number one for yield in the Tennessee State Variety Test last year. Based on acreages grown in 2009 with yields of 4 Bu/A above the average of commercial varieties, Allen provided an additional $1.1 million in revenue to farmers. The bean, which is the Round Up Ready® version of 5601T, has excellent resistance to two important soybean diseases, soybean mosaic and stem canker, plus it weathers the weather well.

“This bean gives our growers lots of options to wait to plant in times when there have been problems with spring weather, such as flooding,” says President David McKinney of UniSouth Genetics Inc. “There’s also a lot of drought tolerance, so it seems to survive whatever weather comes at it very well.”

**Patents are pending on the following discoveries:**

**Insecticidal compositions and methods of use.** Several plant and fungal species harbor genes that code for compounds that can kill harmful insects. These can be used in genetically engineered organisms or serve as natural pesticides. – Dr. Neal Stewart, Department of Plant Sciences

**Process for creating heat-stable protein-based food ingredients.** This technology has direct applications for high protein beverages that are transparent and shelf stable. This is applicable to complex formulations with salt, sugar and other ingredients. Further, the technology embodies applications to incorporate compounds that are water-insoluble or have low solubility, e.g., fat-soluble vitamins, with maintained clarity after thermal treatments. – Dr. Qixin Zhong, Department of Food Science and Technology

**Switchgrass promoter and uses.** New promoters from switchgrass are useful to enable precise gene expression and higher genetic engineering rates. – Dr. Neal Stewart, Department of Plant Sciences

**Methods and systems for ecosystem analysis and monitoring.** This covers techniques found to detect harmful bacteria in water. – Dr. Neal Stewart, Department of Plant Sciences

**Device for the automatic determination of hydration patterns in seed foods.** Hydration is the first step in processing of many food products including seeds and powders; however, determining changes in volume and mass over time is cumbersome, labor intensive and time consuming. The device being developed requires minimal training-supervision and is able to automatically take measurements in a minute scale basis, over several hours and with several replications. Accompanying software is being developed so that the operator will receive specific hydration parameters and statistical analysis for both quality assurance and processing intervention. – Dr. Federico Harte, Department of Food Science and Technology

**Glyphosate-inducible promoter and its use.** A new promoter from a weedy plant induced by the herbicide glyphosate will facilitate precise chemically induced gene expression in genetically engineered plants used for research in controlled laboratory conditions. – Dr. Neal Stewart, Department of Plant Sciences
Method that bonds plastic with natural materials, like wood, flax, sisal or kenaf fibers, using ultrasonic vibration. This invention can be used for improved coatings and construction of new composite materials. The new materials provide an alternative to conventional treated wood used for decking and fence materials and consequently reduce environmental impacts. – Dr. Siqun Wang, Center for Renewable Carbon

Process that improves fractionation efficiency of biomass pretreated for fuel production. This advance increases the speed of separation and the purity of the process streams, and expands the potential for co-production of valuable chemicals and materials in the biorefinery. – Dr. Joe Bozell, Center for Renewable Carbon

Use of enzymes to degrade lignocellulosic materials. To efficiently break down plant biomass, insects use enzymes called cellulases from symbiotic bacteria and fungi in their guts, as well as cellulases produced by the insect. Combined activity of these different cellulases results in very efficient degradation of lignocellulose. AgResearchers have been prospecting insects for novel cellulases and have identified cellulases that display high activity. They are cloning and combining these enzymes so they can be characterized and used in biorefineries for more efficient pretreatment and degradation of lignocellulosic biomass. – Dr. Juan Luis Jurat-Fuentes, Department of Entomology and Plant Pathology

Proteins from an insect that increase toxicity of Bt insecticidal products. This Bt toxin enhancer seems to work not only for moths and caterpillars, but also beetle and grub pests. Use of this product increases the effectiveness of Bt pesticides by lowering the dosage needed to kill insects, expanding the range of activity and reducing the risk of resistance development in the target insect. – Dr. Juan Luis Jurat-Fuentes, Department of Entomology and Plant Pathology

Discovery of a novel gene capable of imparting herbicide resistance. The gene potentially could be used for crop improvement. – Feng Chen, Nan Zhao and Greg Armel, Department of Plant Sciences.

Production of low phytate soybean varieties for poultry and swine feed to enhance nutrition for non-ruminant livestock and improve water quality by reducing phosphorous loads to the environment that leach from manure. UT’s Soybean Program has transferred two genes responsible for the low phytate trait to its exceptionally productive and high yielding soybean variety 5601T. AgResearchers can now identify the presence of these two genes based on the sequence of the genes, allowing the scientists to more effectively transfer the genes to other elite lines in the soybean breeding program. – Dr. Vince Pantalone, Department of Plant Sciences

Proteins from an insect that increase toxicity of Bt insecticidal products. This Bt toxin enhancer seems to work not only for moths and caterpillars, but also beetle and grub pests. Use of this product increases the effectiveness of Bt pesticides by lowering the dosage needed to kill insects, expanding the range of activity and reducing the risk of resistance development in the target insect. – Dr. Juan Luis Jurat-Fuentes, Department of Entomology and Plant Pathology

Prediction of formaldehyde emissions from manufacturing processes using a real-time sensor. Formaldehyde emissions have been classified as a known carcinogen. – Dr. Tim Young, Center for Renewable Carbon

Identification of proteins that change in Bt-resistant insects. Using new DNA-based kits, growers can quickly and specifically detect the presence of Bt-resistant moths and caterpillars in their crops. – Dr. Juan Luis Jurat-Fuentes, Department of Entomology and Plant Pathology

“We’re proud to be leading in so many areas, and we view our successes as a testament to the caliber of our researchers and their commitment both to the university and problem solving to benefit society,” Oliver says.

To learn more about any of these projects contact UT AgResearch at 865-974-7121.
Stare into a mirror and you’ll see yourself just as you are. But if you ask Alice, the Mad Hatter or the Cheshire Cat, they’ll tell you the real trick is to see the vision behind the simple reflection—to see what you can be.

At the UT Institute of Agriculture, one of the most forward-thinking and prevalent visions for the future involves migrating our present petroleum-based society to one that is powered by renewable carbon, i.e., those carbon atoms whose potential energy is locked among the material that makes up the green world around us.

The recently formed Center for Renewable Carbon (CRC) is UTIA’s response to the perceived societal shift from a hydrocarbon-based, or petroleum-based, economy to one that is based on the economic importance of carbohydrates grown as part of agricultural and forestry industries. The CRC consolidates our research, teaching and outreach programs related to bioenergy production and biomaterials processing into one cohesive unit. Previously four separate, but related programs were involved in the effort: the Office of Bioenergy Programs, the Forest Products Center, the Sun Grant Initiative, and the Carbon Sequestration Program. Dr. Tim Rials, who was serving as director of the Forest Products Center and director of research and development for the Office of Bioenergy Programs, has been appointed as the CRC director.

“The CRC is designed to form a consortium of scientists from across the UT System, other institutions of higher education, state, and federal and private partners,” says an enthusiastic Rials. “Our express purpose will be collaborative research and education associated with converting renewable carbon into energy, fuels, and useful industrial chemicals and materials,” he notes.

A chemist by training, Rials has long been fascinated by the economic potential of a sustainable, carbohydrate-based economy. His goal is to expand the Institute of Agriculture’s role in scientific discovery and knowledge transfer and to train the researchers and industrial workforce required to develop and maintain a sustainable bioeconomy that utilizes all biomass, including forest products.

Critics say biomass technology is like the March Hare, late on arrival, but

Dr. Tim Rials (top) provides visionary leadership to endeavors that span basic and applied science to the production of switchgrass in farmers’ fields. Bottom, 1983 Animal Science graduate Randall Peters has been growing switchgrass under contract for UT since the program’s inception in 2008. He farms 225 acres of switchgrass and raises dairy heifers.

Dr. Joseph DiPietro, UTIA chancellor, disagrees. He believes the CRC reflects a timely, solid new vision. “As the state’s land-grant institution, the University of Tennessee has an obligation to respond to societal issues for the benefit of the state’s citizens, our economy and the nation’s economy,” he says. “The Institute has already made great strides in the area of biofuels through our internationally recognized Biofuels Initiative and in wood product utilization through our Forest Products Center, so the Center for Renewable Carbon was the next logical step to enhance the competitiveness of our scientists and programs.”

Viewed as a whole, the new center represents quite a rabbit hole for UTIA scientists, students and Extension personnel. If you prefer a more elegant analogy, the CRC’s research and outreach programs represent a looking glass with many new facets, each reflecting a bright vision for biomass industry. —Patricia McDaniels
Healthy Grasslands and Forests Mean a Healthy Tennessee

Healthy farms and forests are good for all of us. It’s part of our legacy. Losing them would be a little like losing our blues or our country music or our mountain scenery. It’s just part of what Tennessee can and should be—and historically was,” explains Dr. Pat Keyser, director of the Center for Native Grasslands Management and associate professor of Forestry, Wildlife and Fisheries.

Tennessee’s native grasslands have largely disappeared, most before World War II. Grasses like big and little bluestem, indiangrass, eastern gamagrass and switchgrass used to cover millions of acres in Tennessee and the southeastern U.S. In fact, grasslands are probably the most imperiled type of natural community in the Southeast. They have dwindled to less than 1 percent of their original coverage, and those that remain are not healthy.

Because grasslands were the easiest lands for pioneers to settle, they were the first to go under the plow. On the other hand, forested grasslands, like savannahs, have grown up into thick forests and the grasses were choked out. Tennessee still has some of these grasslands, but they are in small, isolated places across the state.

Along with the loss of grasslands, we’ve lost plant diversity and wildlife habitat. “One of the telltale signs is that grassland birds have declined by 90 percent in the last half generation or so,” Keyser said. “That tells us that something is missing from our landscape. There’s a piece to the puzzle that’s not there any longer.”

The Center for Native Grasslands Management, created in 2006 as a part of the Department of Forestry, Wildlife and Fisheries at the Institute of Agriculture, addresses the loss of this natural, renewable resource. Bringing back these grasslands will benefit the associated bird species, as well. Several studies being conducted by the center are designed to help make farms and forests more profitable, including those focused on forage systems, oak savannahs, and biofuel production.

Much of the work of the center is conducted at the institute’s AgResearch and Education Centers. One major initiative involves grazing studies being implemented at the Middle Tennessee, Highland Rim, Ames and Greeneville centers. Working with colleagues Dr. Gary Bates, professor of Plant Sciences; Dr. John Waller, associate professor, and Dr. Neal Schrick, professor, both of Animal Science; and Dr. Craig Harper, professor of Forestry, Wildlife and Fisheries, Keyser hopes native grasses will give producers an additional tool for improving livestock forage. An additional benefit would be the return of grassland birds. “If we can restore the grasslands themselves, then the almost inevitable corollary will be that we will have the grasslands bird populations back,” he says.

Another conservation effort, the National Bobwhite Quail Conservation Initiative (NBCI), is also now a part of the Institute of Agriculture. The institute was recently selected as the permanent home of the NBCI, thanks to the center’s efforts and reputation and its strong external partnerships with organizations like the Natural Resources Conservation Services (NRCS) and the Tennessee Wildlife Resources Agency (TWRA).

FORAGE SYSTEMS

Livestock production is the single most important agricultural enterprise in Tennessee. The backbone of that enterprise is fescue, a cool-season grass. The center is examining native warm-season grasses as a complement to fescue. The premise is that native
Native warm-season grasses may also be an important component of reforestation efforts on reclaimed surface mine sites due to their compatibility with tree seedling growth and survival. Some work already underway through the leadership of Dr. Jennifer Franklin, associate professor of Forestry, Wildlife and Fisheries, seems promising. Further opportunities to explore this effort and how wildlife habitat on reclaimed mines sites may benefit are being evaluated.

Through the efforts of the center, Keyser says one day he’d like to be able to drive across Tennessee and see native grasses grown on farms from Somerville to Johnson City. The picture in his mind is one of “lush bluestem, well-conditioned steers and abundant quail.” —Lorna Norwood

The call of the bobwhite quail is as dear to some as the twinkling of hundreds of fireflies on a summer night. For most, the song is only a memory because this iconic symbol of rural America and the South has declined in population by 80 percent over the past four decades. A partnership between the Institute of Agriculture and the National Bobwhite Conservation Initiative (NBCI) hopes to stop that downward spiral.

“In a word, the partnership between NBCI and the University of Tennessee means everything,” says Don McKenzie, executive director of the NBCI. “UT will provide a solid foundation for the growth of this conservation initiative.” A recent significant, multi-year grant from the National Fish and Wildlife Foundation seemed to put a seal of endorsement on the partnership and will ensure growth.

McKenzie points out that if innovative forage practices currently being explored by the Center for Native Grasslands Management can make sense to and be adopted by producers in the southeastern bobwhite range, it could be a huge boon for quail with millions of acres of prime habitat being gained.

—Lorna Norwood
The safety of the nation’s critical agriculture and food safety infrastructure may very well reside at the University of Tennessee College of Veterinary Medicine. The college is home to the Center for Agriculture and Food Security and Preparedness. Founded in 2006, the center combines the expertise of UT faculty with other institutions across the country to develop and deliver state- and community-level training and to conduct research related to agroterrorism, biosecurity, foreign animal diseases and related topics.

The center provides training to the agriculture and food industry professionals; federal, state, county and local officials; extension and crop specialists; agricultural crime units; and others involved with food and agriculture security planning. Since its inception, the center has trained more than 3,000 individuals.

Drawing upon a rare combination of expertise in both food safety and veterinary medicine, Dr. Sharon Thompson has grown the center from concept to a multimillion dollar federally funded organization that involves 30 instructors and a number of federal and state agencies. Thompson came to UT after 12 years in federal government, including service as Department of Health and Human Services liaison to the Joint Institute for Food Safety Research and associate director for veterinary, medical and international affairs with the Center for Veterinary Medicine, U.S. Food and Drug Administration.

Courses taught include:
- Management 332: Agriculture and Food Vulnerability Assessment Training
- Management 337: Food Vulnerability Assessment Training (a subset of Management 332)
- Agriculture Emergency Responder Training
- Foreign Animal and Emerging Diseases (in collaboration with Plum Island Animal Disease Center)

Courses under development:
- Utilization of National Credentialing Standards for Animal Emergency Responders (two courses, one Web-based and one instructor-led)
- Effective Sharing of Information and Intelligence Related to the Importation and Transportation of Food (three courses, Web-based, instructor-led and video-based training)

Each course is rigorously developed and evaluated by subject matter specialists and Homeland Security officials. Courses are either led by teams of certified instructors or are Web-based. Thanks to grant funding, the only cost to participate is the rental charge, if any, for meeting space.

“We strive to be interactive and use scenarios that participants can work through that relate strongly to potential threats and hazards in their community. These include wildfires, earthquakes, floods as well as animal disease outbreaks,” Thompson says.

“When they leave the course, we want them to be able to immediately apply what they’ve learned to their work. Our evaluations tell us that they are being able to do that.”

What are the threats that Thompson sees for the nation’s infrastructure?

“One area of real vulnerability is transportation, specifically the importation of food and how food moves through our nation. The biggest concern is intentional contamination, but there are other issues, too, such as the known problem of transport of drugs from Mexico that are hidden in food shipments.

“On the animal side, potential problems are more from the perspective of introduction of animal diseases. Our credentialing program centers on how to respond to disease outbreaks and work effectively to contain them.”

To learn more about the Center for Agriculture and Food Security and Preparedness, visit the center’s website at www.vet.utk.edu/cafsp or call 865-974-0345. —Margot Emery

Agriculture emergency responders train in how to perform decontamination procedures in a course presented by the UT Center for Agriculture and Food Security and Preparedness.
Lyme disease, Rocky Mountain spotted fever, Johne’s disease, *E. coli*, *Salmonella*, bovine tuberculosis, rabies. These are diseases spread by wildlife that can afflict humans, livestock or companion animals and they represent areas of inquiry by scientists affiliated with UT’s Center for Wildlife Health.

The center is housed in the College of Agricultural Sciences and Natural Resources’ Department of Forestry, Wildlife and Fisheries. Its work, however, is multidisciplinary—spanning population biology, ecology, wildlife management, physiology, molecular biology and disease diagnostics, mathematical modeling, geographic information systems, spatial statistics, environmental toxicology, and pathology.

Led by New Zealand native Dr. Graham Hickling, the center focuses on disease spread through animal populations, often triggered by human impacts such as habitat loss and land use change. By understanding the interrelations of wildlife, livestock and humans, center researchers strive to ensure healthy populations of all species.

Such issues require not only fundamental research into wildlife disease ecology and diagnosis, but also application of research findings in ways that provide practical assistance for resource managers and policymakers. The center’s recent diagnostics research has provided farmers and wildlife managers with a new Johne’s disease test for livestock and other ruminants that is far more effective than any available previously—so much so that it has been awarded two patents. “We also have been screening ticks in the vicinity of Oak Ridge and Crossville, for local residents who have concerns about tick-borne diseases,” Hickling adds. So the range of impacts the center has is wide.

The researchers survey amphibian, fish and mammal populations to detect and measure disease spread and its threat to other species. For example, one ongoing study examines whether tadpoles and frogs can serve as hosts for diseases of concern to cattle and humans, such as *Cryptosporidium parvum*, *Salmonella* spp., *E. coli* and *Listeria monocytogenes*.

“Our training is to think about multispecies interactions and the influence of the environment on those interactions,” Hickling says. “One of our big issues right now is measuring the abundance of deer and other mammals at a study site near Arnold Air Force Base. We have to spend huge amounts of time just to assess animal numbers and disease prevalence.”

The air base study is part of a four-year, $2.5 million National Science Foundation-funded study to understand Lyme disease spread throughout the Eastern Seaboard. While ticks that are capable of carrying Lyme disease are present in Tennessee, Hickling’s research suggests that most of the rashes and fevers that develop after bites from Tennessee ticks are not Lyme disease, but rather are caused by other, less understood pathogens carried by the ticks.

As the center conducts research, it also prepares students for careers in wildlife health through a degree concentration taught within the Department of Forestry, Wildlife and Fisheries and through links with UT’s NIMBioS program (see page 5), which is involved in animal infectious disease modeling. “We tell students that a bachelor’s degree will rarely qualify them for a job in this discipline,” says Hickling, who is also an associate director of NIMBioS. “Most will need an advanced wildlife degree, a veterinary degree or both. But the field still interests many students.

“One comment I would make about the center’s work is that not all wildlife disease needs managing,” he adds. “Disease is a natural part of ecosystems. What we’re focusing on are diseases that have gotten outside of the normal scope of things, often because human-induced changes get imposed on these systems so that natural disease processes become unnatural.”

Visit wildlifehealth.tennessee.edu or call 865-974-6173 to learn more about the Center for Wildlife Health.

—Margot Emery
For many companies in the food industry these days, preparing new products for the marketplace is an exacting science, one that can involve extensive sensory evaluation. Such evaluation involves presenting samples of food products to consumers to determine how well they like the product overall and how well they like the product’s taste, aroma, color, appearance and texture.

At UT, a Sensory Evaluation Lab has been part of the Institute of Agriculture since the 1970s, with ties to a jointly operated UTK-UTIA program reaching farther back in time. Operated by Dr. Marjorie Penfield from 1986 forward, the Food Science and Technology Sensory Evaluation Lab invites volunteer panelists to participate in food and packaging evaluations conducted for about 25 different companies.

CAREER DEMAND

For Department of Food Science and Technology students, the lab and two upper-level sensory evaluation courses are a training ground in sensory science. “The understanding they gain helps our graduates acquire a base knowledge in sensory science,” Penfield says.

“My philosophy is that not everyone who goes through our sensory and dairy products evaluation courses will be sensory scientists, but they’ll be in positions in the food industry where they work with sensory scientists. By learning the basics, they can be more efficient in their jobs in terms of specifically defining what they want to learn from a project that they have the company’s sensory department or a sensory consulting firm do for them. They can go into a meeting with sensory scientists and say, ‘These are my objectives for the study.’”

Sensory evaluation can be vital when processing equipment is replaced and industry executives want to make sure the product produced on the new equipment tastes the same as that from the old, or if there is a difference that it is viewed as an improvement by consumers. Having to shift from one ingredient supplier to another can also have an impact on a food product, its perceived sensory attributes and appeal. And then there are the questions that surround new product development.

“Industry has figured out that they can save money if they do the right kind of sensory testing before they put products on the market,” Penfield says.
“For a long time, in many companies, company personnel would just do an informal tasting around a table and then put products on the market. Now, however, an increasing number of companies are using sensory evaluation to provide information to help minimize the risk in decision-making—so much so that they can’t find personnel to fill all the positions. Demand for sensory scientists is great so graduates entering the field can expect good career opportunities as well as higher salaries than many other food science graduates.” Many of Penfield’s former students and lab workers are in sensory positions in the industry.

**CHALLENGES OF RESEARCH**

One of the areas many companies have looked at closely is reducing sodium in their products. They can’t afford simply to reduce it by a certain amount and see if buyers notice that. With sensory testing they can establish how much they can lower the level without people noticing there’s a difference in the product. “You can do salt measurements in the chemistry lab, but that’s not going to tell you how it’s perceived by a human being,” Penfield emphasizes. “It’s perception that we’re really measuring.”

Interest in participating in the evaluations is high; Penfield sends e-mail invitations out to a list of 600 staff, faculty and students. The number of panelists used for a test varies from 54 for triangles to as many as 100 to 150 for a liking test. Sometimes specific groups of volunteers are recruited for a panel. Groups may be based on age, gender, or product usage or potential product usage. Products sometimes are sent home with volunteer panelists for evaluation.

**REFLECTING ON HER CAREER**

Penfield says the challenges of the work are what reward her. “Some of our companies know exactly what they want in terms of objectives. Others rely on us for assistance with their research design, so we have to figure out precisely what it is they want to know. Teaching about sensory science is frequently a part of working with a company,” Penfield says. “That dynamism makes sensory science fascinating.”

The professor says she’s really enjoyed working with food industry companies and seeing the sensory evaluation field flourish in recent years. “It’s nice because of the variety of products we’ve worked with. I like that my students have been able to work with different products.” —Margot Emery

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**SENSORY AT BUSH BROTHERS INC.**

Bush Brothers Inc. has contracted with UT’s Sensory Evaluation Lab over the years, in addition to conducting sensory evaluations in-house and at other sites in the U.S.

Dr. Phil Perkins, senior vice president in charge of research, development and innovation says, “One of the keys to product success is to consistently provide the consumer with products that have appealing sensory properties and hence are well liked. Through the use of sensory science, we are able to improve existing products and create new products that delight the consumer.

“We consider the Sensory Center at the University of Tennessee to be an extension of our internal sensory capabilities which enable us to get closer to the consumer in order to gain a better understanding our products. Information gained through sensory testing enables us to add value in many areas within the organization—examples are numerous and include such things as ingredient sourcing, assessment of competitive products, improvements in manufacturing, process development, evaluation of new packaging and, of course, new product development. The Sensory Center at UT is truly an indispensable asset in this regard.”
Volunteer gardeners in several Tennessee cities are donating their time—and expertise—to grow food for the hungry and educate others about horticulture. These hard-working people are part of UT Extension’s Master Gardener program.

What used to be discarded riverbank property along the Tennessee River in Chattanooga now has a definite horticultural theme. Hamilton County’s Master Gardeners built a new greenhouse there and put in two dozen raised beds outside the building to grow vegetables and plants. “It’s a very green area, and we intend to keep it that way,” says Master Gardener Donna Smolinski.

As a group, the Hamilton County Master Gardeners worked 1,200 hours on this project. “The average was 70 to 80 hours per person last year, and that’s an enormous amount of effort if you really consider it,” says volunteer Mike Payne.

The greenhouse is part of a downtown revitalization effort that includes picturesque trails along the river. But the most important neighbor to the greenhouse is the Chattanooga Area Food Bank, just across the parking lot. Produce grown at the greenhouse will be donated to feed the hungry. “You couldn’t get it any fresher if you come out here and cut it in the morning and carry it in the building and give it to someone who needs it,” says Master Gardener Patsy Boles.

The intent is not only to grow produce for the food bank, but also to teach. UT-TSU Extension gardening specialist Tom Stebbins plans to lead horticulture workshops at the site and turn the area into a learning center. “All the food here will go to a good cause—either to the Food Bank directly or to people who work in the gardens and get a share of the food,” Stebbins says. “But more so for education. We may show the latest tomato varieties or what’s the best lettuce.”

The Hamilton County Master Gardeners and Chattanooga Area Food Bank raised more than $200,000 for this project.

Meanwhile, a few hours away, Lela Donahoo’s green beans should complement a fine meal for someone soon. She’s a Master Gardener in Montgomery County and volunteers at Clarksville’s Garden of Hope. Volunteers here have raised more than 1,000 pounds of produce and donated it to seven different area food banks. “There is a greater need I think than most people realize,” Donahoo says. “Every time we take the food, people tell us about how many people there are wanting the food.”

With poverty, you often find a connection to poor nutrition. It’s documented that the underprivileged have higher rates of obesity, and this garden looks to provide needy people with good, healthy fruits and vegetables.

UT and TSU Extension agent Karla Kean leads this program and says the Garden of Hope includes lots of variety. “The healthy foods, the local foods—they’re fresh. They’re full of vitamins because they’ve just been harvested, and that’s what we want to provide to the people who need food,” she says.

The Clarksville Office of Housing and Community Development is also a partner in this program. People in Clarksville can contribute to this program by adopting sections of the garden.

To learn about UT’s Master Gardener Program visit http://mastergardener.tennessee.edu. —Chuck Denney
The devastation caused by flooding to Nashville and its environs was well documented. Also hard hit were croplands, animal agriculture operations and one of the state’s premier horse training facilities. Agents and specialists with UT Extension quickly mobilized to lend a helping hand along with personnel with the Tennessee Department of Agriculture.

While the impact the floods in Tennessee had on agriculture won’t be fully known until after the fall harvest is in, it’s clear the heavy rains and rising waters did affect the state’s farming industry—likely at a cost in the millions of dollars.

Livestock owners and crop producers are doing the best they can to clean up, replant and salvage the year.

A dozen inches of rain, and the Cumberland River in Cheatham County spilled into some of Tennessee’s richest farmland, transforming a 100 acre soybean field into a lake several feet deep. For farmers, it was time to start over.

Cheatham County Producer Ricky Burton said, “According to what it does when the water goes down, I may have spots of beans that come up. Probably the best thing to do is just go ahead and disc it and replant the whole field.”

If there was a positive for agriculture it was the timing of the flood. With the rains coming in early May, farmers were able to replant some crops. But just because waters recede, that doesn’t mean a field will come back. Many producers lost seed and fertilizer that was washed away. Also flood waters can leave behind fungus and other pathogens that could prevent some row crops from growing again.

“We’ve lost probably 3,000 to 4,000 acres of potential crop land this year,” says Ronnie Baron, director and agent with UT Extension Cheatham County. “We’re concerned about the debris that’s been left and the potential of contaminants.”

There’s also the flood’s impact on livestock. Early reports indicate that not many animals were swept away, but now cattle producers will have the added expense of water-damaged forage and lost fencing. UT Extension experts say farmers must be concerned about herd health.

“Really some of the most important things we considered as we recovered from this flood was to keep ample water, a fresh supply of water to these cattle, and feed. We urged producers to check for weather-damaged feed and the potential of mold,” says Animal Science Assistant Professor Justin Rhinehart.

At one of Tennessee’s largest horse training facilities, Brownland Farms in Franklin, hundreds of animals were evacuated as the flood waters rose, as seen in a YouTube video. UT Extension agents and volunteers helped relocate many horses to the Williamson County Ag Center.

“We just started moving horses to higher ground. And it just kept raining and kept raining and kept raining,” says Robin Anderton of Brownland Farms. “So we made a conscious decision to try to transport some of the animals off the property just for safe measures.”

“We were able to accommodate Brownland and get through a serious situation without losing any horses or any people. All in all, it was a great day,” says Matt Horsman of UT Extension Williamson County. “We turned a bad situation into a great event.”

That’s the attitude it will take for Tennessee agriculture to move beyond the flood of 2010.

You can watch a video news release about this and other institute topics at the UTIA.com channel on YouTube. —Chuck Denney
Undergraduate and master’s students enrolled in the College of Agricultural Sciences and Natural Resources have some important new options to enhance their training, thanks to an expansion of one of the college’s oldest majors.

Now known as Agricultural Leadership, Education and Communications, or ALEC for short, the program encompasses and expands former programs in agricultural education that trace their roots back to the Smith-Hughes Act of 1917. This legislation gave federal aid to states to teach agriculture in land-grant colleges. The funding prepared students at UT for careers as teachers of agriculture. Training for agricultural extension agents followed later.

Today, thanks to new areas of specialization brought in with program leader Dr. Carrie Stephens and Dr. Bryan Patterson, the program also encompasses agricultural communications and leadership—subjects that can serve as major concentrations for undergraduates or serve as capstone courses for seniors seeking to enhance their skills in those areas.

National assessments project that within the next decade, the demand for food, agriculture and natural resources graduates will exceed the available supply by 4 to 10 percent. Graduates find employment in very diverse career paths, including agricultural education teachers, agricultural extension agents, loan agent/directors, sales representatives, education specialists, field representatives, Peace Corps volunteers, agricultural journalists, farm managers, news reporters and editors, Internet managers/staff writers, consultants, law, natural resources conservation and sales. Salaries are competitive with many other professional fields.

“We’re excited about all that we have to offer, and we want our current and incoming students to be aware of the many options that exist within our unit,” Stephens says. “We see our major concentrations, minors and master’s level program as presenting a number of good options for individuals pursuing careers in agriculture and natural sciences, and also for those in other areas outside these disciplines.”

Older alumni may recall Winter School, a six-week program of intensive study where UT Extension agents across the state would travel to Knoxville to work toward a master’s degree in agricultural and extension education. Today that program is delivered both at UT and online, and it has an enrollment of 70 to 80 students composed of Extension agents and teachers of agriculture. Both of these professions are tied to their locales, so online delivery makes sense, Stephens says. Recently the program attracted a surprise student, an Army serviceman based in Fallujah, Iraq. The program also draws out-of-state students.

Agricultural leadership, the specialty of Patterson, offers students a foundation of knowledge, skills and experiences in personal, team and organizational leadership. Students learn how to work in small and large teams, develop interpersonal and intrapersonal skills and enhance their learning through internships in the agricultural industry and nonprofit settings.

“These skills will enhance the careers of all students,” Patterson says, “whether they choose the subject area as a major concentration, a minor, or decide to take courses while majoring in other departments. We’re proud to be able to offer them.”

To learn more about the Agricultural Leadership, Education and Communications Program, visit www.alec.utk.edu or call 865-974-7371. —Margot Emery
YOU ARE KNOWN AS AN INNOVATOR IN YOUR DEPARTMENT. WHAT ARE SOME CHANGES YOU'VE MADE TO COURSES YOU TEACH?

Well, we’ve restructured our two plant materials courses so that students learn about woody trees and shrubs at the same time that they learn about herbaceous plants—perennials and annuals—because we decided we wanted our graduates to be able to use these plants together in their work. We’ve also implemented podcasting and videos in our horticultural communications class so students gain experience in formulating messages about plants and creating content in ways that are well received by audiences.

Additionally, I’ve tried to find ways to make sure I’m not the only teacher in the classroom. Students are often required to do work outside of class that initiates valuable discussion. I love learning from students and watching them learn from each other.

IS TECHNOLOGY EVERYTHING THESE DAYS?

For us, it’s definitely not. One-on-one time with each student is important. It’s great to sit down and listen to incoming freshmen as they talk about their interests. Students truly value both their face time with our faculty advisors and having the opportunity for discussion in classrooms. So we do that. It makes for a richer experience for everyone.

HOW DO YOU TEACH?

I think my approach can baffle students sometimes, but I believe it’s important to not just lecture in the traditional way, but reach them in ways that fit how they learn. Maybe it’s getting their hands dirty in a garden or going out on their own and finding information. Today’s student is continuously gathering and filtering information in their personal lives. So I look at ways we can use those skills that benefit the classroom discourse and benefit their career preparation. I also try never to tell them what I think is good or bad when I give an example in class. Instead I let them explore how they feel about a topic and wait to express my opinion until the end of discussion. This opens them up to others ideas that might be new to them and helps them discover how they feel about a topic.

WHAT’S YOUR BEST TEACHING TOOL?

Hands down, it’s the UT Gardens. In the courses I teach on plant materials, we go there almost every day to see plants in real settings and study how they’re used. During class both students and undergraduate teaching assistants will take photos of the plants and post them to our course Facebook page. Students use that information to create a whole new learning environment that they control.

DO YOU HAVE A FAVORITE PLANT?

I’ve never been one to pin down a favorite. Mine changes from day to day. I’m a big fan of all deciduous conifers like our native bald cypress.

WHAT’S YOUR FAVORITE PUBLIC GARDEN besides THE UT GARDENS?

I have one for every region of the country. One of the best in our area is the Daniel Stowe Botanical Garden in Belmont, North Carolina. It’s a great garden that changes dramatically from season to season. It’s particularly nice in fall.
Student Biosystems Teams Shine in International Competitions

Two student engineering teams from the UT Institute of Agriculture’s College of Agricultural Sciences and Natural Resources captured first place in their respective competitions at a recent international meeting.

The student teams from UT’s Department of Biosystems Engineering and Soil Sciences won first place for a dual solar roof design and a cryogenic sprayer at the international meeting of the American Society of Agricultural and Biological Engineers (ASABE) in Pittsburgh.

Seniors Adam Duncan, Lori Gibson, Alex McLemore and Rebecca Messer took first place in the national AGCO Design Competition for their work on a cryogenic sprayer. Dr. William Hart, Biosystems Engineering associate professor, and Dr. Greg Armel, Plant Sciences assistant professor, worked as the team’s advisors.

The sprayer applies liquid nitrogen to partially freeze weeds. A mechanical roller is then used to crush them. The students designed the system to address limitations associated with current organic weeding methods. Partially freezing weeds for removal results in minimal soil disturbance and lower labor costs.

“This design has potential to make sustainable agriculture more productive and economical while protecting the environment,” said Hart. “Their effort is a perfect example of using problem-solving tools to tackle a real-world problem, which is exactly what our senior design sequence is supposed to do.”

Meanwhile, a team of seniors Warren Edmunds, Mark Newlin and J.D. White won first place for a dual solar roof project in the National Gunlogson Environmental Design Competition.

The dual solar roof not only absorbs sunlight to make electricity, but also collects warm air passing beneath the panels. The air can then be used to heat water or directly heat a house.

“Solar radiation is a largely unused resource, especially on a sunny day when you can produce up to a thousand watts per meter squared,” said J.D. White. “So that’s a 1,000 watt light bulb for every 3-foot by 3-foot section on a roof.”

The team’s advisor, Dr. John Tyner, associate professor of Biosystems Engineering and Soil Science, says that this could be a roof on many houses in the near future and is an affordable technology. “This is not far-fetched. They built the project with a $3,000 budget. The lumber was recycled from a previous structure, but everything else they built was for $3,000. So it’s a pretty economical way to go. The solar panels just keep getting cheaper and cheaper,” he said.

You can view a news story about the dual solar roof on the institute’s YouTube channel by searching utiacom. —Doug Edlund
When I heard AstroTurf® was launching this program with my alma mater, I definitely wanted to attend in light of my commitment to player safety.

University of Tennessee and AstroTurf® Break Ground on Research Center for Safer Athletic Fields

Signifying a new era in athletic field research focused on injury prevention, the University of Tennessee and AstroTurf® broke ground last summer on the Center for Safer Athletic Fields. The center is a comprehensive research initiative to improve athletic performance and reduce injuries that can occur on both natural and synthetic turf playing surfaces. Ceremonies were held at the research site located at the UT Institute of Agriculture’s East Tennessee AgResearch and Education Center in Knoxville, Tennessee.

“ AstroTurf® possesses all facets of synthetic turf manufacturing from polymer development to field installation, making them an integral research partner,” says Dr. Jim Brosnan, assistant professor of Plant Sciences at the UT Institute of Agriculture and research co-investigator. “ We had to be able to work with a company that has the ability to use our research findings to advance the products installed in stadiums across the globe. It is our hope that comparing natural and synthetic turf surfaces to this scale will allow for fields to be safer at all levels of play.”

“Our top priority is ensuring the highest standards for athletic field safety and outstanding performance,” says Bryan Peeples, president of AstroTurf®. “Advancing the science behind injury prevention helps athletes of all ages and the sports turf industry overall.”

During the groundbreaking ceremonies, special guest Eric Berry, former Tennessee Volunteer and first-round NFL pick for the Kansas City Chiefs, discussed the importance of the initiative. “Reducing playing field injuries keeps professional and student athletes in the game longer,” said Berry. “When I heard AstroTurf® was launching this program with my alma mater, I definitely wanted to attend in light of my commitment to player safety.”

**Game-changing Initiative**

The Center for Safer Athletic Fields aims to make a long-term difference. While determining the safety and performance of AstroTurf® products compared to various natural turfgrass systems, UT turfgrass scientists will also monitor these relationships over time. Additionally, they will evaluate the environmental impacts of each system. The research should lead to the development of new, more accurate methods for testing the safety and performance of all synthetic turf systems. Initial research started this fall, and the center will be fully operational by 2011.

Natural surfaces will be planted with bermudagrass, Kentucky bluegrass and others. Both mechanical and human studies will be performed to create “real play” conditions. The research will be scientifically based for statistical analysis. In addition, the geographic location of the site will enable scientists to conduct research on a variety of surfaces from both cool- and warm-season climates. The unique outdoor research facility will comprise 60 small-scale athletic research fields constructed from a variety of playing surfaces. UT turfgrass scientists will compare the safety and performance of synthetic playing surfaces to natural grass surfaces. Field qualities will range from those employed for professional-level sports to surfaces used by schools, public parks and recreation fields.

“This has been a lifelong dream both for me and my colleague Dr. Jim Brosnan,” says Dr. John Sorochan, associate professor in Plant Sciences at the UT Institute of Agriculture and research co-investigator. “Both of us as graduate students focused our research on improving athletic fields for all levels of play. It is especially rewarding to have the support of high profile athletes like Eric Berry who share our vision for safer playing surfaces.”

The UT Center for Safer Athletic Fields will also further education for University of Tennessee students, enabling UT Plant Sciences faculty to add another level to the curriculum to train and educate future sports turf practitioners.

—Lorna Norwood
Early Success in Campaign for Tennessee
WHILE NEEDS CONTINUE, GIFTS ARE ALREADY MAKING A DIFFERENCE

Thanks to the overwhelming response of its alumni and friends, the Institute of Agriculture has reached its Campaign for Tennessee fundraising goal of $85 million more than a year ahead of schedule.

The campaign was launched in January 2005 with a $1 billion dollar goal for the UT system. When setting the goal for the institute, the development staff, volunteer leadership and Chancellor DiPietro decided the campaign marked the perfect time to step up the institute’s efforts in raising private support. The group established an initial goal of $55 million in 2005, then raised the goal to $85 million in 2008. Thanks to the generosity of faculty, alumni, friends, corporations and foundations, the institute surpassed its $85 million goal in June 2010. As of September 30th campaign receipts stood at nearly $92 million ($91,783,092) with 14 months to go in the campaign.

How will the donations make a difference? Below are some examples of campaign gifts that will have a real impact on the future of the Institute of Agriculture:

- The College of Agricultural Sciences and Natural Resources encompasses seven academic areas of the Institute of Agriculture.
- $2 million was donated to provide distinguished professorships.
- $700,000 has been given for graduate fellowships.
- $100,000 was committed for international travel and experiences for UTIA students.
- $2 million was given as an estate gift for endowments in the Department of Animal Science.
- $1.17 million planned gift for students with financial need and outstanding teaching, research and Extension programming awards.
- $4 million was committed to endow a program in organic education and research in the Department of Plant Sciences.
- UT AgResearch includes 10 AgResearch and Education Centers that span the state of Tennessee where basic and applied research is carried out to benefit our state.
- More than $3.5 million was contributed by agriculture-related companies and organizations to further research at the centers.
- $600,000 was donated to the Middle Tennessee AgResearch and Education Center.
- The UT Gardens have received several donations including a $200,000 addition for a new rose garden and undergraduate internships.
- UT Extension provides educational programming in 4-H youth development, adult agriculture, and family and consumer sciences with a local office in every county in Tennessee.
- Local county endowments have added more than $5.4 million during the Campaign for Tennessee.
- $1.3 million was donated for statewide endowments.
More than $500,000 was donated to Extension from agriculture-related companies.

$250,000 in scholarships was given to enhance 4-H scholarships across the state.

The College of Veterinary Medicine provides cutting-edge teaching and research to prepare veterinarians and care for animals of all shapes and sizes.

A $20 million gift was committed for the new Small Animal Hospital and its ongoing support.

$5.5 million for small animal clinical sciences in support of feline patients.

A $4 million estate gift will provide an endowed distinguished professorship in animal quantum genomics and public health.

A $3.37 million estate gift provides for collegewide faculty development and support the Large Animal Clinical Sciences department.

A $750,000 commitment will fund a chair in Small Animal Clinical Behavioral Research for five years.

A $1 million estate commitment will provide for faculty and staff development in Large Animal Clinical Sciences.

$500,000 was provided over 10 years for the study of oncology and metabolic disease.

Gifts totaling $585,000 have been raised in support of the Large Animal Hospital expansion and renovation; these funds will be matched dollar-for-dollar by the university.

“We are very thankful for the support of all of our contributors from those making ongoing annual contributions to our largest donors,” says Vice Chancellor Buddy Mitchell. “All contributions were important, and every gift will make a difference for our programs. We are also deeply grateful to the UTIA Campaign Executive Committee that provided volunteer leadership and major gifts that were instrumental to our campaign success. Committee members are Charles Wharton-Chair, Waymon Hickman, Ben Kimbrough, Milton Magee, Myers Parsons, Jim Rainey, Jeff Ray, Al Samsel, Jim Webb and Steve Williams.

“While we are deeply grateful to our contributors, it is very important that we point out that our job is not complete. In 2005 when the institute began the Campaign for Tennessee, over $200 million in needs were identified. As the University of Tennessee and our nation suffer through an economic downturn, shrinking funding, rising tuition, and calls for expansions of our programs have taken center stage,” Mitchell notes.

As the final year of the Campaign for Tennessee begins in 2011, the institute hopes that everyone who has not yet made a financial commitment will consider a pledge to the programs that you care about the most. As a land-grant institution for the state of Tennessee, the UT Institute of Agriculture is an invaluable partner in agriculture for our farming families, industries, small businesses and citizens. The institute needs your investment, so please consider supporting one of its programs in the coming year. — Rhodes Logan
Land managers at Arnold Air Force Base want to learn more about the relationship of deer-vehicle collisions and the associated habitat along roadways. They also would like a clearer picture of deer density on the base in order to better manage the deer population within the existing habitat constraints.

Wildlife scientists seek to evaluate and better understand various deer density estimators, as well as learn how forage availability may predict deer movement and how deer reproductive biology affects their movements.

Answers to these issues are coming from a pioneering, multifaceted study that began in 2008 and continues today. Led by Drs. Craig Harper and Lisa Muller of the Department of Forestry, Wildlife and Fisheries, the study involves the work of three master’s students and an array of technology, including forward-looking infrared cameras (FLIR) mounted on fixed-wing planes, GPS collars on deer that download data via satellite, and DNA techniques on deer feces.

“With the GPS collars, we’re able to monitor deer movement without actually being there around the clock.” We are using the DNA data as a mark-recapture technique to quantify deer density.

Harper and his students are analyzing a handful of other deer density estimators. Each technique has strengths and weaknesses. They’re seeking the best combination of estimates, including observation cards, which have been filled out by hunters the past three deer seasons. They are also examining forage availability and proximity to roadways to see how forage and habitat structure may influence deer movement along roadways.

Muller is interested in how does may select mates. “Traditional wisdom is they just wait for a buck to come by, but that doesn’t make much sense. Females have so much energy invested in reproduction and lactation. In our preliminary studies in Delaware and Maryland, we’ve documented does moving far beyond their home range during the rut. We think this may support the hypothesis that they are actively engaged in selecting mates to maximize reproductive fitness.”

The three master’s students are each focusing on a particular segment of the study.

Matt Goode of Blairsville, Georgia, is using DNA data from feces to determine deer density and sex ratio of the herd.

Jared Beaver of Salisbury, North Carolina, is comparing six deer density estimators as well as assessing deer forage available across the base to determine which estimator is best for Arnold Air Force base and the nutritional carrying capacity of the available habitat.

Finally, Seth Basinger of Demopolis, Alabama, is studying habitat use and movements of 10 adult bucks and 10 adult does fitted with GPS collars. Updates on position are recorded every three hours, making it possible to analyze the spatial relationships of collared deer for up to two years. Locations are uploaded to the ARGOS satellite once a week and sent to our computers.

The team is also evaluating a new tranquilizing protocol developed by large animal anesthesiologist Dr. Tom Doherty of UT’s College of Veterinary Medicine. As they work with darted deer, the students remove ticks for a deer health study by Dr. Graham Hickling of UT AgResearch’s Center for Wildlife Health.

Funding from the U.S. Fish and Wildlife Service is providing support for the study, with additional assistance from the UT AgResearch Agriculture Innovation Funding program, which helps advance studies that show the potential to attract funding by the National Science Foundation.

To learn more about this study, contact Dr. Craig Harper and Dr. Lisa Muller at 865-974-7126.

—Margot Emery
A dead-on looking decoy, a barely visible net and authentic bird calls on a tape recorder. Be very quiet. Add in a little time and patience, and soon a visitor comes swooping in.

Scientists with UT AgResearch catch a cerulean warbler, a native songbird to the Royal Blue Wildlife Management Area in Campbell County. Don’t worry. The bird isn’t harmed by this brief capture. In fact, doctoral student Than Boves and Dr. David Buehler, professor in the Department of Forestry, Wildlife and Fisheries, are working to protect the warbler. “Today’s population is about 25 percent of their population from the 1960s,” Buehler says.

Tennessee is home to many species of beautiful migratory songbirds. Environmental factors threaten their food supply and nesting, but scientists with UT AgResearch are working to help the birds thrive in the Cumberland Mountains of East Tennessee. Almost a quarter of the cerulean warblers on the planet come from this area. This is the warblers’ main breeding ground, and it’s vital to maintain their habitat.

Buehler says the cerulean warbler is unique in its appearance—with striking blue feathers—and its sweet call. These tiny creatures are also amazingly strong and resilient. “These birds are migrating about 2,000 miles in the fall and winter to South America,” Buehler says. “They winter in the foothills of the Andes Mountains, and they come all the way back. They cross the Gulf of Mexico and fly all the way back to Tennessee.”

The cerulean warbler may be losing some of its natural habitat due to a combination of resource development such as coal, gas and timber. But UT AgResearchers believe there can be a balance between resource management and a healthy songbird population. “The cerulean is like the proverbial canary in the coal mine, but it’s the cerulean in the forest. It’s an indicator of forest sustainability,” says Buehler.

For some reason, the cerulean always comes back to the Cumberland Mountains to reproduce. “This is like nirvana for cerulean warblers,” says Boves. “If you were going to choose one place to protect in the world, if you want to protect cerulean warblers—we’re standing at it right now.”

Boves takes the cerulean captured in the net and first measures its weight: 10.1 grams, about the same as two nickels. “He’s a big one,” Boves says. In fact, it’s one of the largest warblers these researchers have seen.

Boves now will band the bird with colored strips in hopes of catching it again to study migratory patterns. “We’re looking at survival. So when we capture these birds and band them, we’re able to follow them through their life cycle,” he says.

These songbirds were petitioned in 2000 to be put on the endangered species list. But that plan was halted because of the need by UT’s Institute of Agriculture and other state and federal agencies to study habitat requirements for the birds.

Cerulean warblers only spend a few months of the year in Tennessee, but it’s the most important time of their lives. Researchers will continue their work to ensure the birds have a place where they can return and sing their song.

You can learn more about the institute’s songbird research at http://web.utk.edu/~buehler.

—Chuck Denney
At the Western Region 4-H Horse Show in Martin, more than 150 local students showed off their horsemanship skills in hopes of taking home a ribbon, trophy or a coveted spot at the State 4-H Horse Championships. But there was one plaque handed out that day that no one saw coming … at least not the announcer.

Retired UT Extension Agent and Western Region 4-H Horse Show Announcer Tommy Patterson was honored in surprise fashion in front of the arena audience for the nearly 40 years of service he has devoted to the 4-H Horse Program. Patterson provided the early leadership that not only led to the development of the Region 4-H Horse Show, but also promoted strong growth in the horse program overall.

“In 1972 there was only one horse show that members in our area could show in, the Western District Show in Trenton, and very few 4-H members were participating at that time,” Patterson recalls. “Now we have the Regional, State and Southern Region 4-H Horse Shows, and the program has grown from a very small number of families participating to statewide participation with former members now volunteering and encouraging their children and people in their communities to participate.”

The 4-H Horse Program is part of the animal science project. The program allows students to develop horsemanship skills. Besides working hands-on with horses students also pick up skills through educational activities such as horse judging, horse bowls, hippology, speech and demonstration contests. In fact, you don’t have to own a horse to be involved.

“The Western Region 4-H Horse Show and the 4-H Horse program in general provide 4-H’ers with an excellent opportunity to gain valuable educational information in the areas of selection, feeding, grooming, showing and providing daily care for their horses,” says Richard Powell, Western Region Extension program leader. “During the past 40 years this program has experienced significant growth in both participation and involvement of volunteers.”

Patterson helped encourage that growth in participation by training countless members in showmanship and horsemanship and by also training adult leaders to help with projects. Through the years he’s planned and developed numerous events and served as chairman of the Western Region 4-H Horse Show. Although he’s been retired for several years, he remains actively involved in the program.

“The horse project teaches responsibility, builds self esteem, and involves the whole family, not just the individual member. Caring for and training a horse encourages patience and hard work,” says Patterson. “For those reasons, any time I am asked to help, I am proud to do so.” —Ginger Trice Rowsey
“Feral” means gone wild, and a cat born and raised in the wild or a domestic cat that has been abandoned or lost and reverted to the wild is a feral cat. Feral colonies consist of at least two cats and can have as many as 200 cats. Research shows the number of feral cats in the United States may equal the number of owned cats—that’s 81.7 million cats. Feral cat colonies are everywhere, and the management or elimination of the colonies is controversial. Some argue for trap and euthanize to rid communities of the problem. Teresa Jennings, director of the UT College of Veterinary Medicine’s Companion Animal Initiative of Tennessee (CAIT), believes trap, neuter and return along with community education, while not a quick fix, is a fix. She has created Feral Fixin’ to help address these growing colonies.

Reducing the number of unwanted and unadoptable cats entering animal shelters, fewer nuisance calls to animal control, and keeping feral cat populations in Knox and surrounding counties from expanding is what CAIT’s Feral Fixin’ is all about; in short, litter control. Feral Fixin’ is an event Jennings first organized in October 2005 in honor of National Feral Cat Day. She describes Feral Fixin’ as a spay and neuter event that brings together a host of volunteers from the community. “College faculty, staff and students, local veterinarians and other members of the community have devoted more than 4,000 volunteer hours to Feral Fixin’ events since we started doing this,” Jennings says. Caretakers of feral colonies trap the cats that are then sterilized, vaccinated and returned to their colony. In April CAIT celebrated the 1,000th feral to go through the program, and at least two feral cat colonies have been stabilized. “That means no new cats are coming in and no new births,” she explains. While Feral Fixin’ targets wild cats, Jennings says it’s important for cat owners (or people owned by cats) to keep their felines in the house. “If you can’t do that (even though it is the law to keep your cat on your own property), help keep the entire cat population down by having your cat spayed or neutered as early as possible. Please don’t ‘litter’ and don’t wait till they are six months and pregnant.”

Feral colonies are usually found near a food source, such as behind restaurants or near dumpsters, and the ferals will see you before you see them. Jennings says people who feed ferals without following through with spaying or neutering them are helping with the overpopulation. Increasing the carrying capacity of the community does not help the feral cats. “I wish we didn’t have to have Feral Fixin’,” Jennings says. “I wish we didn’t have any feral cats or homeless animals in Tennessee, but until that day comes, we will continue to work to try to control the explosion of the feral cat population.” To help with this effort, contact your local feral cat organization or visit www.vet.utk.edu/cait for information about trapping and neutering a feral colony.

Being responsible pet owners (including vaccinating and altering your own cats) is the single most important thing everyone can do to help reduce the overpopulation problem. — Sandra Harbison

**Efforts Big and Small Are Need to Help Manage Feral Cats. Here Are Some Ways to Help:**

- If you know of an unmanaged colony, contact UT’s Companion Animal Initiative of Tennessee — www.vet.utk.edu/cait or call 1-866-907-SPAY (7729) — to connect with a local feral cat caretaker group in your area.
- Volunteer your time to feral cat management. You can help monitor a colony or lend a hand at a TNR clinic (trap, neuter, return).
- Make a monetary donation to a TNR clinic. Your donation will be used to cover surgical costs, medicine and/or food for the cats.
- Think about joining a local feral cat caretaker group.
- Stay informed about the national feral cat effort by visiting www.alleycatallies.org.
- Pay the spay/neuter fee for someone who can’t afford it. To locate a subsidized spay/neuter clinic in Tennessee, contact CAIT.
CHRIS HAYNES, COASTAL MANAGEMENT SPECIALIST, NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

Haynes (’05 B.S. Plant Sciences and Landscape Systems) works for the Baldwin Group under contract with NOAA in Charleston, South Carolina. The mission of the NOAA Coastal Services Center is to support the environmental, social and economic well being of the coast by linking people, information and technology. “We work with private and public sector partners to address coastal issues. Using my design background, I work with coastal communities and professionals to visualize the impacts of coastal changes and potential development. Such visualizations can spur stakeholders to develop strategies that mitigate negative impacts on their communities and allow them to ‘see’ what these potential changes may look like; however, what I enjoy most about my job is the work I am doing to help coastal communities become more resilient and adapt to coastal risk.”

BRENT GALLOWAY, GENERAL MANAGER/CHIEF FORESTER WITH THE COAL CREEK COMPANY

Galloway (’97 B.S. Forestry) says, “When I graduated, I never would have guessed that my career path would lead where it has.” First he worked as a forester for consulting forestry companies in Tennessee. Then, in 2007, he started his own company called Forest Management Services Inc. Two years later, he sold the business to his largest client and went to work with them as their general manager and chief forester. The client also hired his forester Amy Morgan (’06 B.S. and ’08 M.S. Forestry). The Coal Creek Company is publicly traded, owns 72,000 acres in East Tennessee and has been in business since 1872. It operates a sustainable timber harvest program, mineral leases, 130 rental homes, 18 windmills on Buffalo Mountain, the Coal Creek Off-Highway Vehicle Area, plus a campground named Windrock Park. In addition to work that is done on their own property, they operate Southeastern Forest Management Services, which provides consulting forestry services to Tennessee and Kentucky. “Even though things have been extremely busy for the last year, I think I have my dream job.”
Jim Stocker hasn’t just had a dream job. He had a dream career, one that drew upon every bit of his business acumen and helped define an industry. The ‘59 agricultural business major reached the highest levels of management in one of the most successful agribusiness firms in recent history, Murphy Farms. Murphy was a major player in the phenomenal growth of the swine industry in North Carolina during the 1980s and ’90s. Stocker’s tenure with Murphy lasted 28 years, during which he rose to vice president, executive vice president and general manager, president and vice president of the board of directors. He helped the company surge to swine operations in eight states. He also helped engineer and manage the development of many cost-reducing technological production changes. Stocker grew up in an era where the only accessible school was near his maternal grandparents, and he studied by kerosene light, returning to his parents twice a week to get a bath and a change of clothes. As a farm boy, Stocker managed cattle among other chores and, in his retirement, he jokes that that’s what he’s returned to as he and his son, Mike, operate two contract sow farms and a 220-cow beef operation that feeds out its steers and heifers and develops bred heifers. They have expanded the operation even as Stocker has battled colon cancer, something that is now in remission, thanks to preventative chemotherapy treatments. “I tell everyone that there is plenty of time for sadness, and we need to live every day for doing better.” He made and is still making many contributions to his industry, community and UT, and that makes him a dream alumnus for us.

**JIM STOCKER, PRESIDENT, MURPHY FARMS**

**ZACKARY MOORE, GREENHOUSE TECHNICIAN, OAK RIDGE NATIONAL LABORATORY, PLANT GENOMICS GROUP**

As a May ’10 (B.S. Plant Sciences) graduate, Zackary Moore is early in his career, yet he’s already finding considerable success. Moore began work at ORNL as a student, mowing grass. That position turned into a greenhouse/lab assistant appointment while he was still in school. When he graduated, ORNL hired him to manage their research greenhouses within their Environmental Sciences Division. Millions of dollars of research balances on how well he is able to manage the facilities. “With my recent promotion and three brand new state-of-the-art greenhouses—making for a total of six houses now—I need someone to help with the work load, so I’m now looking for CASNR students to hire to assist me.”
Two familiar classroom buildings on the agriculture campus are undergoing renovation. Built in the 1950s, Brehm and McLeod have served generations of animal science and food science and technology majors. Their facilities were antiquated, though, and work underway will result in new walls, ceilings, floor coverings and lighting, among many other changes. “We’re essentially replacing everything but the support beams,” says General Services Director Mike Keel. “The renovations will give our students a comfortable and up-to-date environment in which to learn. These are going to be gorgeous buildings.”