

*The Kentucky
Agricultural Experiment Station*

121st

Annual Report
2008

To His Excellency,
The Honorable Steven L. Beshear
Governor of Kentucky

I herewith submit the one hundred and twenty-first annual report of the Kentucky Agricultural Experiment Station for the period ending December 31, 2008. This is done in accordance with an act of Congress, approved March 2, 1887, titled "An act to establish Agricultural Experiment Stations, in connection with the Agricultural Colleges established in the several states under the provisions of an act approved July 2, 1862, and under the acts supplementary thereto," and also the act of the Kentucky State Legislature, approved February 20, 1888, accepting the provisions of the act of Congress.

Very respectfully,

Nancy M. Cox

Nancy M. Cox, Associate Dean for Research
Director, Agricultural Experiment Station
Lexington, Kentucky
June 30, 2009

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Experiment Station-Affiliated Departments and Centers

Agricultural Economics
Animal and Food Sciences
Biosystems and Agricultural Engineering
Community and Leadership Development
Entomology
Equine Initiative
Family Studies
Forestry
Horticulture
Kentucky Tobacco Research and Development Center
Landscape Architecture
Livestock Disease Diagnostic Center
Merchandising, Apparel, and Textiles
Nutrition and Food Science
Plant and Soil Sciences
Plant Pathology
Regulatory Services
Robinson Station
Sustainable Agriculture and Food Systems Working Group
Tracy Farmer Center for the Environment
USDA-Agricultural Research Service-Forage Animal Production Research Unit
Veterinary Science
West Kentucky Substation

Purpose of the Kentucky Agricultural Experiment Station

As a land-grant institution, the University of Kentucky is responsible for serving the people of the commonwealth of Kentucky. The College of Agriculture, with its research, teaching, and extension activities, has developed a structure and organization to provide the mandated land-grant services in agriculture and related areas.

The Kentucky Agricultural Experiment Station has been providing research results to farmers and rural residents for more than 100 years. The continued advancement of Kentucky agriculture attests to the benefits of applying new knowledge and technology. Much of the research leading to increased quantity and improved quality of Kentucky's agricultural output was performed by the Experiment Station. College researchers also have successfully addressed problems of agribusiness, consumers, international trade, food processing, nutrition, community development, soil and water resources, bioenergy, and the environment.

Although much Experiment Station research has immediate application to agricultural- and natural resource-related problems, scientists are also involved in basic research, generating new information to help solve present and potential problems. The ability of Kentucky producers to be competitive in domestic and world markets requires an expanded base of knowledge in emerging areas of research applicable to agriculture, food, and natural resources.

This Annual Report lists Experiment Station research projects and publications completed during 2008. A personnel list is also provided.

The research programs of the Kentucky Agricultural Experiment Station have benefited Kentucky's agriculture over the past century, and the results of present and future research will continue to serve Kentucky's primary industry.

Statewide Research

Research activities of the Kentucky Agricultural Experiment Station were conducted at Lexington, Princeton, Quicksand, and Owenton and in counties throughout the state in 2008.

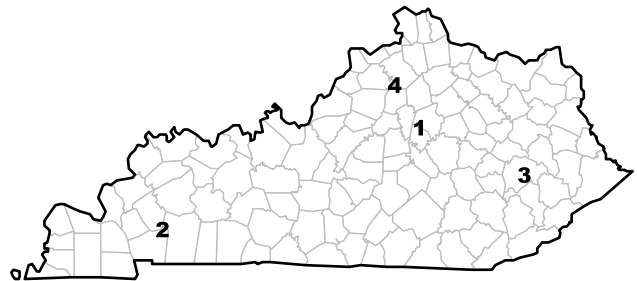
Efforts are constantly made to ensure that the research studies have application to the problems of all Kentucky farmers and other clientele groups. Locations of the experimental facilities provide conditions representative of most sections of the state.

Map Position 1

- **Campus**—Laboratories and specialized equipment for all research program areas.
- **Coldstream-Maine Chance-Spindletop Farms**—Dairy cattle, poultry, and horses; forages and grain crops, tobacco, and turf.
- **Horticulture Research Farm**—Fruits, vegetables, and ornamentals, including organic production.
- **UK Animal Research Center (Woodford County)**—This farm was purchased in late 1991 as a location for development of state-of-the-art food animal (beef cattle, sheep, and swine) research programs.

Map Position 2

- At **Princeton (Caldwell County)**, the Research and Education Center facilities and the West Kentucky Substation Farm are devoted to research on grain crops, beef cattle, fruits, ornamentals and vegetables, forages, and tobacco.



Map Position 3

- At **Quicksand (Breathitt County)**, the Robinson Station is the location of research on fruits and vegetables, ornamentals, forages, grain crops, tobacco, and wood utilization. Quicksand is also the headquarters of Robinson Forest, which spreads over parts of Breathitt, Perry, and Knott counties and is the site of forestry and watershed management research.

Map Position 4

- At the **Eden Shale Farm**, located in Owen County near Owenton, experimental and demonstration studies are conducted on forage crops, tobacco, fruits and vegetables, and beef management.

Equine Initiative

In March 2005, UK's College of Agriculture set out to better serve Kentucky's multi-breed horse industry by building on the university's strong tradition of excellence in equine research, instruction, and service and to enhance the state's well-deserved status as the "Horse Capital of the World." UK President Lee T. Todd Jr. named the Equine Initiative as one of UK's "Commonwealth Collaboratives," a term encompassing projects aimed at improving Kentucky's schools, business climate, environment, health care, and lifestyles.

The mission of the Equine Initiative is to discover, share, and apply new knowledge that will enhance the health, performance, and management of horses commensurate with the signature status of Kentucky's horse industry. It is an overarching framework for all equine programs at UK and employs a cross-disciplinary approach that has resulted in enhancements to existing equine programs and the formation of new equine areas of emphasis.

It is reflective of UK's Top 20 vision and, since its inception, has attracted new students, new faculty, and new research and outreach opportunities for the state. Its ultimate goal will be realized when UK becomes the world leader in equine teaching, research, and outreach/extension. Currently, the College of Agriculture has an equine focus that includes a team of more than 50 faculty and staff working from eight different departments. Eight new horse-oriented faculty have been hired since the Equine Initiative's inception.

One of the most tangible of the Equine Initiative's enhancements was the formation of an undergraduate degree program. There are now 120 students in the program, with just over 50 percent from outside of Kentucky. While a lot of other schools have an equine major of some type, only two other land-grant universities in the United States—Colorado State and Arizona State—have stand-alone equine degree programs.

In the past few years, the Equine Initiative has also formed important partnerships, including:

- Partnering with other Kentucky universities with equine programs to create a unified booth presence at the Alltech FEI World Equestrian Games in 2010 and the legacy of a joint Kentucky equine education display for years to come.
- Recognized as the official equine program for the 2010 Alltech FEI World Equestrian Games.

- Partnering with UK Health Care on a shared horse/rider educational campaign for the state of Kentucky.
- Partnered with the University of Louisville on hosting an international equine summit in 2008, with plans to do so again in 2010.
- Exploring other educational partnerships with the University of Louisville with regard to courses offered.
- Partnered with the Kentucky Quarter Horse Association in 2008 and 2009 for a breeders' symposium to educate the horse industry about equine reproductive research.
- Sat on the Lexington-Fayette Urban County Government Equine Task Force to look into ways to help Kentucky's equine industry be competitive with that of other states and remain Kentucky's signature industry.
- Working with top reproductive scientists and veterinarians at Hagyard Equine Medical Institute and Rood and Riddle Equine Hospital to help plan for the next international equine reproductive summit, which is taking place in Kentucky in 2010 and which will attract scientists from across the world to UK's campus.

Program areas of excellence for equine science in the College of Agriculture include:

- **Maxwell H. Gluck Equine Research Center:** Developed vaccines against six of the 10 most common equine infectious diseases.
- **Livestock Disease Diagnostic Center:** Serves as animal health sentinel and has the highest equine caseload in the world.
- **Department of Animal and Food Sciences:** Has a notable legacy in nutrition research.
- **4-H and Youth Programs:** Reach more than 6,000 youth.
- **Horse College,** adult education program: Reaches more than 1,500 people.
- **Pasture Evaluation Program:** Has evaluated more than 50 horse farms and 3,700 acres in central Kentucky.
- **Economic Cluster:** Concept expansion.
- **Horse Environments:** Research on mud, pervious concrete, stream crossings, and more.
- **HorseQuest:** Central Web-based source for information.

Kentucky Tobacco Research and Development Center

The Kentucky Tobacco Research and Development Center (KTRDC) conducts and supports unique research programs that examine new agricultural crop opportunities based on tobacco and other plants.

The KTRDC program emphasizes applications-oriented research specifically designed to facilitate the development of new crop-based businesses and technologies for Kentucky agriculture. KTRDC-funded projects explore the development

and use of tobacco as a production system for plant-made pharmaceuticals and industrial products and the discovery and development of new plant natural products having potential for commercialization.

Located in its own building on the University of Kentucky campus in Lexington, the Center is funded by a dedicated tax on cigarette sales in Kentucky.

Tobacco/PM(I)P Research

Agriculture is realizing huge benefits from improved crops developed through application of plant biotechnology. These new crop varieties exhibit such useful qualities as remarkable resistance to insect damage, markedly reduced dependence on herbicides, etc. Following these advances in crop-performance traits, there is increasing interest in engineering plants to make new products, thereby enabling agricultural crops to be used as renewable resources supplying such valuable materials as medical drugs, industrial enzymes, specialty plastics, and novel food ingredients. These new applications for plants, including tobacco, have the potential to generate entirely new markets for farmers and growers. Such new opportunities are constantly in demand as traditional tobacco agriculture declines and the family farm seeks new agricultural markets. And while the production of protein-based medical drugs in plants might be regarded as competitive with traditional methods of manufacturing them (fermentation using cultured microbes and animal cells), the use of plants to make industrial materials that are conventionally obtained from petroleum will obviously be of immense benefit in a future of rising and fluctuating oil prices.

The primary goal of KTRDC research is to facilitate and encourage the use of tobacco in Kentucky as a production system for plant-made pharmaceuticals (PMPs) and plant-made industrial products (PMIPs).

Research on Plant Natural Products

The Center is also developing new technologies to expand the discovery and use of non-protein substances which are made naturally by tobacco and other plants, collectively referred to as “plant natural products.” Many plant natural products are familiar as flavors and fragrances, medicinals, and natural insecticides. Moreover, as mentioned above, many chemicals and consumer-products companies are now taking a serious look at plants as alternatives to petroleum as sources of industrial “feedstocks” for manufacturing plastics, adhesives, and other familiar materials. This application for plants, which is developing in parallel with the more familiar biofuels opportunities, is poised for very rapid expansion and development.

The Center’s research on plant natural products encompasses several approaches and aspects, including metabolic engineering of the plant to diversify and customize the natural products themselves, development of novel detection and screening methods to facilitate natural-product discovery, manipulation of the plant genome to increase yields of biomass and specific natural products, “domestication” of uncultivated species to make them viable as new crops, etc.

Research and Services

The overall objective of KTRDC research is to encourage and facilitate the development of new crop opportunities for Kentucky agriculture, based on new applications for the tobacco plant and new plant-derived “natural products.” KTRDC-funded projects address this objective in several different ways:

- Optimizing the tobacco plant, and tobacco production, for PM(I)P applications;

- Devising new “support” technologies for PM(I)P commercialization, addressing bioprocessing, harvesting, identity preservation, and regulatory compliance, etc.;
- Developing new technologies for enhanced gene expression, metabolic engineering, and discovery of novel natural products in plants;
- Discovering and developing new plant-product concepts having potential to create new markets;
- Assisting companies to explore the use of plants as manufacturing systems for new products.

KTRDC research is conducted by a team of scientists and faculty at the Center’s facilities and also through grants to university faculty in Kentucky. KTRDC grants enable investigators to initiate new lines of research having relevance to the KTRDC program, such as improved gene-vector systems for high-level expression of proteins in tobacco and new strategies for extraction and purification of protein products from plants. In addition, KTRDC in-house research emphasizes longer-term projects and ongoing services, as illustrated by the following examples:

Developing prototype tobacco plants to explore the potential of newly discovered genes to enhance plant performance: Dr. Indu Maiti’s research group uses promoter technology proprietary to the University of Kentucky to prepare transgenic plants for collaborators in the commercial and academic environments.

Economic modeling of new applications for tobacco: Dr. Orlando Chambers’s research includes detailed analysis of tobacco production strategies, as well as in-depth surveys of markets and the commercial potential for diverse product types that might be derived through tobacco farming. This research is used in the design of new tobacco varieties for PMP applications and to assist companies that may become future customers of the tobacco farmer.

Manipulation of “plant natural products”: The enormous variety of medicinal substances, food ingredients, and structural materials obtained routinely from plants attests to their vast potential to produce useful chemical compounds.

Dr. George Wagner’s research explores novel materials produced on the surface of the tobacco leaf, which have potential use as pesticides, industrial chemicals, and pharmaceuticals.

Dr. Ling Yuan is exploring the genetic regulation underlying the production of natural products in plant cells and aims to apply this knowledge to develop novel plants that make useful new substances.

Dr. Guiliang Tang investigates plant natural product pathways using gene silencing technology.

Development of a new tobacco variety and optimized tobacco production system for PMP applications: KTRDC research conducted by Dr. David Zaitlin, Dr. Orlando Chambers, and Rich Mundell is focused on the development of a new tobacco type that will be more economical to produce and better suited to the new applications of the plant as a protein-manufacturing system. The desired new “vehicle” variety for field-based production will exhibit such characteristics as disease resistance (blue mold,

black shank), more economical production through multiple (mechanized) harvesting, compatibility with all appropriate gene expression systems, and several features that will obviate any possibility of commingling with conventional tobacco (i.e., providing “identity preservation”). A separate line of research is aimed at developing an equivalent “vehicle” variety for production exclusively in a contained environment such as greenhouses. This variety-development research has resulted in considerable collaboration and contract-funded work with industry, as companies developing the gene-expression technologies and products for PM(I)P applications of tobacco have sought help from KTRDC in regard to the agricultural aspects of implementing scaled-up production. KTRDC’s support has, in turn, helped showcase Kentucky as a possible location for the companies’ future operations.

Facilities and Equipment

The KTRDC building provides approximately 66,000 square feet of laboratory and office space. State-of-the-art growth rooms provide controlled, round-the-clock, monitored environments for propagation and maintenance of plants and cultured plant tissues. Greenhouse space is available nearby, and KTRDC has its own greenhouses at the university’s Spindletop Research Farm in Lexington.

KTRDC houses equipment for DNA sequencing and analysis, DNA microarray technology, automated liquid handling, most forms of chromatography, and basic mass spectrometry. All KTRDC offices and laboratories are equipped with high-speed data ports and a wireless Internet system for computer networking.

Noteworthy Developments in 2008

Full details of the research progress made by KTRDC-funded scientists in 2008 can be found in a separate KTRDC Annual Report for 2007-08 available directly from the Center. The following highlights serve to illustrate some of this work.

In terms of the plant-made pharmaceuticals (PMPs) using tobacco as the production “host” for medical drugs, researchers at the Center have been pleased to secure a major grant from a company which is new to the PMP opportunity. Our work on this project will benefit from the Center’s previous accomplishments in developing specialized tobacco types and production practices in the field and will now focus this type of research onto intensive greenhouse-based production. Meanwhile, one of the PMP companies with which KTRDC has collaborated in the past and which has previously engaged Kentucky farmers in pilot-scale production of PMP-producing tobacco received a formal USDA opinion that the use of KTRDC-developed *Nicotiana* hybrid plants to produce one of their products would pose no risk to the environment. To our knowledge, this official “finding of no significant impact” (FONSI) is a first for tobacco PMP. It represents a strong endorsement of the Center’s work in developing interspecific hybrids of tobacco that demonstrate little or no ability to transfer the gene for the medical product to other plants.

The Center continues to maintain active dialog with other companies that are making significant efforts to commercialize tobacco production of PMPs. At the time of writing this report, we have another prospective greenhouse-production project under discussion with a company which is new to PMP and an ongoing planning process with one of our earlier commercial collaborators. These efforts at the Center help to ensure that the tobacco-based PMP industry is constantly being reminded of Kentucky as a possible base for their future scaled-up production.

The dramatic rise and fluctuations in oil prices during the year will likely have strengthened industry’s interest in seeking alternative sources of the “feedstock” chemicals from which a vast, diverse range of consumer products are made. It is very pleasing to report much progress in regard to this opportunity over the past year; for example, with the assistance of KTRDC, four faculty at the University of Kentucky (three of whom are housed at KTRDC) were successful in securing a grant from a large consumer-products company to commence development of a specially modified tobacco plant that will produce a natural-product replacement for one such “petrochemical.” The Center continues to interact with the participants working on this project, including the sponsor company, to provide expertise concerning tobacco varieties and intensive, economical tobacco-production practices (so-called “industrial tobacco,” which is quite different from traditional tobacco agriculture).

At the time of writing this report, the Center is also commencing a collaboration with another company interested in making an industrial raw material in tobacco. This product will be a biodegradable polymer having the ability to substitute for petroleum-derived plastics in certain applications. Again the Center’s expertise in economical, field-based production of transgenic tobacco for new uses will complement the technical plant-engineering and product-chemistry expertise of the company. And it is hoped that the experience of working with KTRDC in Kentucky will attract the company to Kentucky-based production in the future.

Many industry sectors that presently rely on petroleum-based chemistry in making their products and that have an interest in moving to more economical, renewable sources of raw materials probably have very limited awareness of the capabilities of modern plant biotechnology. To help them understand the potential of plants, KTRDC has embarked on a series of visits to companies within the immediate geographical region, making presentations that illustrate how plants can be customized to generate materials of interest and summarizing these capabilities at KTRDC and in Kentucky. These visits also result in feedback for us, providing information on the needs and materials which are of greatest interest to the industry at this time. We will continue to conduct this educational activity in 2009, as well as to attend industry and trade-show events to identify more prospective commercial partners.

This unique effort of KTRDC at the interface of plant science and medical and industrial commercial products has continued to be accompanied by the Center’s promotion of cutting-edge “discovery” science through our grants program to university faculty in Kentucky. In addition to supporting the ongoing two-

year KTRDC grants covering a range of topics relevant to crop improvement, development of new applications for plant natural products, etc., the Center awarded two new pilot-project grants this year. The pilot grant to Dr. Jan Smalle will enable exploration of a very novel approach to increase overall plant yield, a topic which is of increasing importance to all efforts that aim to generate transportation fuels from plant biomass. The pilot project conducted by Dr. Hongyan Zhu will initiate new work on fungal disease of the forage crop alfalfa, aimed at eventual development of resistance. Moreover, at the time of compiling this report, the Center is reviewing an application for funding of a novel four-investigator collaborative grant in plant genomics. The subject of this proposed project is a category of plant natural compounds having diverse and important applications (the flavonoids). But the most novel and potentially impactful aspect is the intended

“fusion” of four different avenues of inquiry and technological strategies to achieve a more complete understanding than would be derived from any of them on their own.

During the year, the Center has received many inquiries for advice and informational assistance in regard to the economic production of tobacco for new applications, the best kinds of tobacco to grow for these purposes, the application for federal regulatory approval for conduct of field trials with transgenic plants, the management of field trials with transgenic plants, and other topics in which KTRDC researchers have unique experience and expertise. It is evident that KTRDC is becoming recognized both nationally and internationally as a valued resource on these topics, and we are working to develop new and improved ways to convey the information, including the new series of informational bulletins begun in 2008.

Livestock Disease Diagnostic Center

Administration

Craig N. Carter

The Livestock Disease Diagnostic Center (LDDC) strives to be one of the premier veterinary diagnostic laboratories in the United States, providing the very best and most timely services in support of the practicing veterinary profession, Kentucky animal agriculture, the signature equine industries, companion animals, and public health. As the state’s flagship veterinary diagnostic laboratory, the LDDC’s primary goal is to develop, apply, and utilize state-of-the-art veterinary diagnostic testing methods and scientific knowledge to improve animal health and marketability, preserve the human-animal bond, and help protect and improve public health through the early and accurate identification of zoonotic diseases.

In addition to its clinical diagnostic role, the LDDC provides surveillance for emerging and endemic diseases such as West Nile virus, chronic wasting disease of deer, contagious equine metritis, bovine spongiform encephalitis (mad cow disease), and avian influenza. Furthermore, the laboratory is always on the watch for the emergence of foreign animal diseases such as foot and mouth disease and classical swine fever.

Animal owners use the LDDC’s services through their veterinarians who have expertise in selecting, preparing, shipping, and submitting the proper specimens for testing when necessary. Laboratory findings are reported back to the submitting veterinarian who then consults with his or her clients to implement a curative or preventative solution to disease problems on the farm.

The LDDC faculty, scientists, and technical staff are specialists in essential scientific disciplines directly related to animal health to include bacteriology, clinical pathology, epidemiology, extension, molecular biology, pathology, serology, toxicology, and virology. Disease diagnostic efforts are coordinated and handled by specialists in the appropriate disciplines. Complex clinical cases involving multiple sections are carefully coordinated. The LDDC is organized into sections so that specialized workload/activities can be handled efficiently.

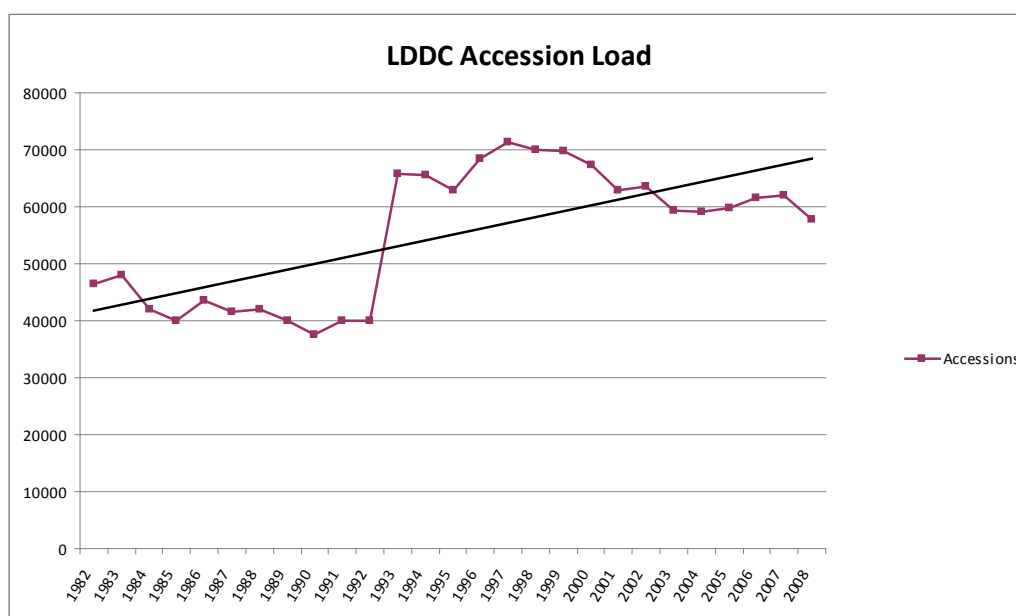
2008 Highlights:

In 2004, the American Association of Veterinary Laboratory Diagnosticians (AAVLD) placed the LDDC on provisional accreditation, primarily due to major necropsy facility deficiencies. To remedy this issue, a capital improvement request was taken to the Kentucky General Assembly during the 2005 session, and the legislature approved the amount of \$8.5 million. An additional \$20 million was requested for a renovation/expansion of the laboratory in the 2008 legislative session which was approved in April 2008. Since that time, the LDDC director, associate director, faculty, and section chiefs have worked closely with the architectural and engineering team to attain 100% design plans. On September 12, 2008, a groundbreaking ceremony for the project was held on the LDDC grounds. Distinguished guests from the Commonwealth of Kentucky, the University of Kentucky, Murray State University, and the agricultural industries were all present for the occasion. The AAVLD Accreditation Team is scheduled to revisit the LDDC in May 2009.

Renovation/expansion construction for 2009 is planned as follows:

- New necropsy facility—starting in March 2009, with occupancy in January 2010.
- New administration/education wing—starting in July 2009, with occupancy in April 2010.
- New pathology offices and serology and histology labs—starting in November 2009, with occupancy in April 2010.
- Balance of renovation—starting in May 2010, with occupancy in December 2010.

The LDDC continues to receive roughly 60,000 cases per year including over 3,000 complete necropsies. Total tests run in each laboratory section will be listed in the individual section reports. Due to the economic downturn and partial hiring freeze, the LDDC has several open technician positions. Periods of surge testing (horse sales, seasonal peaks in disease, outbreaks) make it difficult to turn around test results in a timely manner. It is hoped that this will be addressed as the economy improves.



The LDDC continues to build its outreach programs around Kentucky. A new laboratory convention hall exhibit was constructed so that the LDDC can have a presence at various client and industry stakeholder meetings. The exhibit was on display in Louisville for the Kentucky Veterinary Medical Association (KVMA) annual meeting in October 2008. The Kentucky Vet-LabNet listserv continues to distribute bulletins to over 400 LDDC clients. Several field investigations were conducted by the epidemiology section on Kentucky farms. The LDDC continues to be a consulting resource for the UK Cooperative Extension Service, answering questions regarding disease in agricultural species as needed. The LDDC contributes articles quarterly to the KVMA journal and the Kentucky Cattlemen's Association *Cow Country News*. The LDDC director, faculty, and staff continue to deliver lectures at scientific and lay meetings and participate in the monthly Equine Diagnostic-Research Seminar Series at the LDDC. An interactive tool has been implemented on the LDDC Web site that allows browsers to quickly see what diseases have been diagnosed in the laboratory over the last 30 days.

In spite of the poor economic climate, the LDDC has been quite successful in recruiting and hiring top-notch faculty and staff in a number of sections in 2008. The following positions have been filled:

- Dr. Lori Smith, Analytical Chemist, Toxicology
- Mary Harbour, Quality Control/Quality Assurance Manager
- Bonnie Decker, Clinical Pathology Section Chief
- Dr. Lynne Cassone, Veterinary Pathologist, Assistant Professor
- Dr. Alan Loynachan, Veterinary Pathologist, Assistant Professor
- Jackie Smith, Epidemiology Section Chief
- Hannah Farley, Business Office Manager.

Dr. David Bolin volunteered to form and lead the new LDDC Research Committee to better manage research projects that laboratory faculty and staff are involved in. Some of the projects in progress at LDDC are as follows:

- Wobbler syndrome—Dr. Jennifer Janes
- Contracted foal syndrome—Dr. Craig Carter
- Continuous health monitoring of cattle—Dr. Craig Carter
- Animal disease cluster detection—Dr. Craig Carter
- Contagious equine metritis trial—Dr. Mike Donahue
- Enhanced herpes PCR screening—Steve Sells
- *Rhodococcus equi* pneumonia in foals—Dr. Craig Carter, Jackie Smith
- Nocardioform placentitis study—Dr. Neil Williams, Steve Sells
- Equine uterine rupture study—Dr. Cindy Gaskill, Dr. Lori Smith, Dr. Neil Williams.

Dr. Craig Carter, LDDC director, was elected vice president of the AAVLD. Next year he will assume the role of president-elect, followed in a year as president, and finally immediate past president of the organization. In this role, Dr. Carter is working to improve training and recruiting programs for future diagnosticians. Dr. Carter is also secretary-treasurer of the World Association of Veterinary Laboratory Diagnosticians. This organization hosts an international educational symposium every two years. The next symposium will be held in Madrid, Spain, in June 2009.

Bacteriology/Mycology

James M. Donahue

The primary mission of the Bacteriology/Mycology Section of LDDC is to detect or isolate and identify pathogenic bacteria or fungi present in animals. The section determines

the antibiotics that might be used for the treatment of specific bacterial infections. The section is also responsible for culture of *Taylorella equigenitalis* and *T. asinigenitalis* for federal/state CEM regulatory program in equine.

2008 Highlights:

- Approximately 13,600 aerobic cultures were performed on samples submitted to the LDDC; significant bacterial pathogens were found in about 50% of the samples.
- Approximately 765 milk samples from dairy cows were tested for microorganisms that cause mastitis; over 50% were positive for pathogenic microorganisms.
- Approximately 3,300 different bacterial isolates were tested to determine the antibiotics that could be used for their treatment in exposed animals.
- Approximately 7,450 samples from equines in Kentucky were cultured for the contagious equine metritis organisms. All horses tested were negative for *T. asinigenitalis*. However, four stallions were found to be infected with *T. equigenitalis*. Studies of the source of infection in these horses have indicated that at least seven additional stallions and three mares were infected and that over 580 horses in over 40 different states may have been exposed to the bacterium. Early detection of this infection in the Quarter Horse population by this laboratory prevented this disease from becoming more widespread, and it is hoped that early detection has prevented it from spreading to other equine populations.
- In cooperation with researchers at Michigan State University, the normal flora of the genital tract of male donkeys is being determined. An important preliminary finding of this study is that *Taylorella asinigenitalis*, one of the bacteria causing contagious equine metritis, is sometimes a part of the normal flora of male donkeys and that it can persist for at least 12 months in these animals.
- Approximately 1,880 samples from horses were tested for the presence of leptospires, and tissues from 11 fetuses and/or placentas were positive.
- In conjunction with the Molecular Biology Section of LDDC, we are continuing to evaluate a PCR method for detecting *Crossiella equi* and *Amycolatopsis* spp. in equine placentas. These bacteria are the primary cause of nocardioform placentitis in equine.
- Two new species of bacteria have been isolated from nocardioform placentitis cases. With the assistance of co-workers in USDA and the DSMZ in Germany, the bacteria have been characterized and named *Streptomyces atriruber* sp. nov. and *Streptomyces silaceus* sp. nov. This is the first time that species in the genus *Streptomyces* have been identified as a cause of abortions in horses.
- Determined that the serovars of salmonellae involved in equine salmonellosis belong to either serogroup B or serogroup C. This information is being used to help in the formulation of a salmonella bacterin that can be used in central Kentucky.

Clinical Pathology

Bonnie L. Decker

The primary mission of the Clinical Pathology Section of the LDDC is to provide chemistry, hematology, urinalysis, fluid analysis, fecal parasite exams, and other testing to animal owners, veterinarians, and the agricultural community. In addition, the section provides support and testing to the LDDC's pathologists and testing related to necropsy. Several UK equine and animal science researchers submit specimens to the clinical pathology section for monitoring various chemistry and hematology levels in their research animals. The section is investigating additional testing to meet the needs of the agricultural community, companion animal community, and veterinarians.

2008 Highlights:

- Approximately 952 chemistry test panels were performed on equine, bovine, caprine, ovine, feline, canine, and other species. This represented over 14,278 individual chemistry tests plus approximately 1,747 chemistry tests which were individually ordered.
- Approximately 876 complete blood counts and 859 manual differentials were performed. Approximately 261 specimens were tested for fibrinogen.
- Approximately 1,187 fecal specimens were submitted for fecal flotation and examination for ova and parasites. In addition, 159 specimens were submitted for cryptosporidia.
- Approximately 328 stones were submitted for chemical stone analysis. A wide variety of stones were identified, with triple phosphate (struvite) and calcium oxalate being the most common.

Fluid analysis, protein electrophoresis, urinalysis, and vitreous eye fluids (necropsy) were other tests performed, bringing the total tests performed in the section for 2008 to 19,986 tests.

Epidemiology

Jacqueline L. Smith

The primary mission of the Epidemiology Section of the LDDC is to provide animal disease surveillance and early detection of animal disease outbreaks, assist veterinarians in the investigation of serious and unusual disease problems, and conduct relevant infectious disease research. The epidemiology program is driven by state-of-the-art electronic data-gathering systems that allow for near-real time analysis and dissemination of diagnostic case information that will be useful to practitioners in treatment, prevention, and management of animal disease problems.

We also provide in-depth field investigations to better characterize disease outbreaks by identifying causative etiology. At the request of any farm or producer in the state, and with the approval of the LDDC administration, collection of diagnostic specimens and recommended diagnostic testing are provided free of charge to Kentucky clientele.

2008 Highlights:

- In conjunction with Texas A&M University, the epidemiology section continued to perform field research funded by an award from the Grayson-Jockey Club studying *Rhodococcus equi* on several Kentucky farms.
- Dr. Craig Carter and Jackie Smith were awarded a continuation of their USDA CSREES grant funding.
- Dr. Craig Carter and Jackie Smith along with Dr. Eric Vanzant of UK's Animal and Food Sciences Department and Cris Anderson of Netquest were awarded an NIH grant for "Animal Health Sensing and Surveillance: Early Diseases Detection for Food Supply and Public Health Protection."
- In conjunction with UK's Maxwell H. Gluck Equine Research Center, the epidemiology section investigated an outbreak of foal diarrhea in several local farms.
- The epidemiology section performed a field investigation to determine the cause of death of several cattle on a Kentucky farm in conjunction with the farm's veterinarian and local extension agent. Success in determining the etiology of death prevented further loss of life.
- The epidemiology section performed a field investigation to determine the cause of death of several llamas on a local Kentucky hobby farm.

Molecular Diagnostics

Stephen Sells

Diagnostic PCR assays are being increasingly utilized because of their speed and specificity. Nucleic acid-based tests are now used so that unknown organisms can be identified, closely related organisms can be differentiated, and small numbers of pathogens can be detected in complex samples. Specimens such as blood, swabs, feces, etc. are accepted directly from clinicians and also from the pathology, virology, and bacteriology sections of this and other diagnostic facilities.

2008 Highlights:

- Approximately 6,000 specimens submitted for PCR testing.
- This section continues to be responsible for providing the majority of Kentucky's arbovirus (mosquito-borne virus) testing for an environmental risk analysis program with the Kentucky Department for Human Health.
- The most requested tests included equine herpesvirus type 1 and EHV1 pathotyping (over 1,250), EHV4 (230), *Streptococcus equi* subsp. *equi* (over 1,600), nocardioforms (~1,400), *Clostridium perfringens* (~60), *Lawsonia intracellularis* (~240), *Neorickettsia risticii* Potomac horse fever (~150), BVDV (~215), *Moraxella bovis* (~60), and *Mycoplasma bovis* (~85).
- This section is still cooperating with the bacteriology section and with researchers at UK's Maxwell H. Gluck Equine Research Center and at Michigan State University on a project to determine the normal flora of the genital tract of male donkeys.
- In conjunction with the bacteriology section, we are continuing to evaluate PCR methods for detecting *Crossiella equi* and *Amycolatopsis* spp. in equine placentas. These bacteria are the primary cause of nocardioform placentitis in equine.

Pathology

Neil M. Williams

The full-service Pathology Section of the LDDC performs complete necropsy examinations, histopathology, diagnosis of surgical biopsies, and cytological examinations. As part of the comprehensive necropsy examination, additional laboratory tests are ordered by the pathologists as indicated to assist with a definitive diagnosis. The abnormal findings on necropsy are correlated with other laboratory tests, including microscopic examination of the tissues, and a comprehensive report is prepared for every case undergoing pathologic examination.

Necropsy: A postmortem examination (necropsy) is conducted to identify any pathologic changes in the body systems and tissues that would indicate disease, injury, or any other abnormal process resulting in impairment.

Total Necropsy Cases	2,989
Avian	56
Bovine	695
Canine	230
Caprine	120
Equine	1,620
Feline	113
Ovine	80
Porcine	10
Miscellaneous	65

Histopathology: Tissues are prepared and processed for microscopic examination to reveal changes due to disease or other abnormal process. Tissues from 6,140 cases were processed and 31,311 microscopic slides produced. These slides are examined in detail under the microscope by the pathologists. In addition to hematoxylin and eosin (H&E) stained tissue sections, special and immunohistochemical stains were done in 1,278 cases for the purpose of identifying microscopic organisms/agents that may cause disease or tissue antigens that define or identify cell structures.

Biopsy: Abnormal areas or lesions are often removed surgically or biopsied from live animals and sent to the laboratory for determination of the type of process and recommended treatment and potential prognosis. These tissue specimens are processed and microscopic slides prepared for the pathologists to examine by microscopy. Tissue specimens representing 3,151 cases were processed and examined. A report with diagnosis was produced for each case.

Cytology: Preparations of cells harvested from abnormal lesions or abnormal fluids are placed on microscopic slides and stained for examination under the microscope by the pathologists. Cytopathological examinations were performed, a diagnosis made, and a report generated for 302 cases.

Quality Assurance/Quality Control

Mary Harbour

The overall goals of LDDC's Quality Assurance Program are continuous improvement of service delivery, ensuring quality results, and streamlining work processes for maximum efficiency. Based on American Association of Veterinary Di-

agnostic Laboratory (AAVLD) requirements, International Standards Organization (ISO) guidelines, and Organization of International Epizootics (OIE) standards, the quality assurance program also helps fulfill the university's mission of improving service delivery while achieving excellent human relations (internally and externally), sound leadership, and effective communications.

The design of the quality system focuses primarily on standardization of procedures and policies that allow improvement of the quality of service to our customers. The quality system is a never-ending, long-term development that is evolutionary in implementation yet revolutionary in vision, scope, and impact.

The laboratories are preparing for the upcoming AALVD accreditation inspection which is scheduled for the spring of 2009. The organization of the system has been completed. During the past two years, continued development has progressed slowly due to personnel vacancies and hiring freezes. The sections are finalizing the remaining procedures and placing them under the document control system. The LDDC completed its first quality system management review cycle. To address specimen quality issues identified in LDDC management reviews, the quality manager and other LDDC faculty and staff conducted educational sessions with professional organizations that addressed common client problems of specimen collection, processing, and transportation.

To ensure quality results, the LDDC continues to participate in various proficiency testing programs, check tests, quality assurance activities, and employee training and competency assessments.

Serology

Meg Steinman

The Serology Section of the LDDC provides accurate and timely results for both diagnostic and regulatory testing. The results generated provide veterinarians and regulatory personnel with data upon which to base their decisions. The serology section also performs numerous tests for movement of animals within the United States and for international export purposes. The serology section utilizes a variety of testing methodologies. In 2008, we added a test for antibody detection to *Ehrlichia canis*, Lyme disease, and heartworm antigen. We have switched to an ELISA methodology for EIA antibody tests, allowing for a quicker turnaround time.

In 2008, this section performed a total of 197,175 tests. Below is a sampling of the higher volume tests that are performed in this section.

2008 Highlights:

Anaplasmosis	455
Avian influenza	13,284
Bluetongue	688
Bovine leukemia virus	1,771
Brucellosis (all species)	3,823
Caprine arthritis encephalitis virus	269
Contagious equine metritis	1,094
Epizootic hemorrhagic disease antibody	667
Equine infectious anemia	44,648
Fungal serology	669
Johne's disease	2,152
Leptospirosis	4,843
<i>Mycoplasma gallisepticum</i>	49,354
<i>Mycoplasma synoviae</i>	49,354
<i>Neospora caninum</i>	1,074
Pseudorabies antibody	116
<i>Salmonella pullorum</i> -typhoid	16,660
Toxoplasma antibody	112

Toxicology

Cynthia L. Gaskill

The primary mission of the Toxicology Section of the LDDC is to provide toxicological diagnostic testing capabilities and consultations to Kentucky veterinarians, LDDC pathologists and pathology residents, county extension agents, livestock producers, and pet owners. A large variety of toxicological tests are available through the toxicology section, including assays for metals and minerals in tissues, feed, water, and soil; organic compounds including a multitude of pesticides, drugs, and other chemicals; biological toxins such as plant toxins, toxic insects, and bacterial and fungal toxins; and numerous other toxins. Consultation services include assistance with appropriate sample collection and submission recommendations; determination of appropriate tests to be performed; interpretation of analytical results; therapeutic advice; differential diagnoses; residue considerations; and other general toxicological information.

2008 Highlights:

- A Ph.D. level chemist was hired to oversee the installation of new analytical instrumentation and the development and implementation of new analytical methods.
- Installation of new state-of-the-art analytical instrumentation was initiated, including inductively coupled plasma mass spectrometer, gas chromatograph/mass spectrometer, high-performance liquid chromatograph, and ion chromatograph, among other updates and improvements.
- Older non-validated methods are being replaced with approved, validated methods.
- New quality control measures have been instituted to ensure that results are accurate, reproducible, and meaningful.
- Several toxicological research projects have been instituted in conjunction with UK faculty members as well as external researchers.

In 2008, the toxicology section received samples from more than 1,000 cases, with most cases involving multiple samples such as various tissues, forages, or other samples, often involving multiple animals and with multiple test requests per case. Due

to the lack of unique test codes for many of the tests performed in the toxicology section, actual numbers of each test performed cannot be obtained by a computer data search. This problem will be corrected with the institution of the new LIMS system in 2009. The most common tests requested include metal and mineral quantifications in tissues such as liver and kidney; screening of rumen and stomach contents for organic compounds and drugs; and evaluation of forages and feeds for nitrate content, mycotoxins, cyanide, and other feed-related toxins.

Virology

Mary L. Vickers

The Virology Section of the LDDC provides diagnostic virology support to the laboratory pathologists, the Commonwealth and USDA Veterinarians, and the livestock producers and pet owners of Kentucky.

2008 Highlights:

- This section provides 47 different tests including fluorescent antibody tests; tests for antibodies to viruses; and virus isolations for cattle, horses, sheep, pigs, goats, cats, dogs, birds, reptiles, etc., as well as various tests for the detection of viral antigens and electron microscopy. The section maintains 11 tissue culture cell lines that are used routinely.
- The section performed 36,869 tests during 2008. Of this total, 14,427 were virus neutralization tests for the detection of viral antibodies to meet regulatory requirements for the equine industry.
- Cattle producers have continued to utilize the screening test to detect animals persistently infected with bovine viral diarrhea in the herds. The laboratory tested 14,377 animals this year. Identification and removal of this important source of disease problems and loss of production will give added value to one of our most important commodities.

Regulatory Services

Mission

The Division of Regulatory Services is committed to service and consumer protection of Kentucky citizens, businesses, and industries. Our programs monitor and analyze feed, fertilizer, milk, seed, and soil and are administered using a cooperative, science-based approach.

The Division of Regulatory Services administers four state laws pertaining to the manufacturing, processing, labeling, and marketing of commercial feed, fertilizer, seed, and raw milk. The Division's primary objectives are to protect producers and other consumers from poor-quality, mislabeled, or misrepresented products and to protect agricultural and other businesses from unfair competition.

Feed, fertilizer, and seed are monitored through manufacturing and retail channels for compliance. Label review and product and facility inspections as well as product sampling and analysis are important parts of this process. Raw milk is monitored during marketing to ensure an accurate and equitable exchange between dairy producers and processors and to ensure the integrity of milk from farm to processor.

Ten regulatory inspectors and one auditor cover the state collecting samples, inspecting facilities, and auditing records. Two specialty product inspectors are dedicated to monitoring and sampling small-package and specialty pet food, fertilizer, and seed products. The Division is committed to providing consumer protection to the purchaser of both agricultural and non-agricultural products such as lawn seed, fertilizer, and dog, cat, and other pet food. One inspector is dedicated to the milk regulatory program: auditing records and monitoring activities of sampler-weighers, handlers, testers, and laboratory facilities.

In addition to regulatory programs, service testing is provided through the seed, soil, and milk laboratories. These and other activities in the Division are performed by a dedicated and professional staff who conduct laboratory analyses, provide computer support, process data, and compile reports in addition to various other duties necessary to carry out and administer effective programs.

Auditing Program

H.S. Spencer

Audits of sales and fee payments were conducted on 310 of 378 feed, fertilizer, seed, and milk firms in Kentucky to verify reports, records, and fee payments. Fees are assessed to help defray costs of field inspections, sampling, and analyzing products in accordance with state laws governing the respective programs. Cash receivables were substantiated on 1,010 fertilizer reports, 2,980 feed reports, 798 seed reports, and 96 milk reports. Reports were regularly checked for accuracy and compared to field audits of the submitting firms.

The 2008 fiscal year inspection fees for firms regulated by the Division of Regulatory Services are as follows:

Industry	Fee Assessed/Unit
Feed	35 cents/ton
Fertilizer	50 cents/ton
Milk (handlers and producers)	0.5 cents/100 lb.
Seed tags	4-24 cents/unit

Income received during the period July 1, 2007, to June 30, 2008, from fees, licenses, and testing services provided by the Division was as follows:

Industry	Income
Feed	\$ 1,163,856
Fertilizer	576,508
Milk	192,558
Seed tags and licenses	352,495
Seed testing	56,431
Soil testing	184,466
Total	\$ 2,526,314

Feed and Fertilizer Analytical Laboratory

M. Bryant

The laboratory provided analytical support for the feed, fertilizer, and soil programs. The goals are to provide accurate and timely analyses of official samples for the fertilizer and feed regulatory programs, to support soil analysis and College research programs, and to support agriculture in Kentucky.

The laboratory analyzed 2,846 fertilizer samples and 3,289 feed samples. In addition, the laboratory provided analytical support for 61,169 agriculture-related samples, i.e., soil, manure, greenhouse, water, litter, and research samples. More than 200 special sample analyses for protein and several fat and fiber research sample analyses were performed for the College of Agriculture. The laboratory participated in several scientific meetings: Southern Section AOACI, Midwest Section AOACI, AAPFCO, AAFCO, Fertilizer Methods Forum, and ASFFPCO. Laboratory personnel participated on numerous committees in these scientific and regulatory organizations, including serving as an AAPFCO committee vice chair and a committee chair, and an AAFCO ingredient investigator. Laboratory personnel contributed three presentations concerning ongoing analytical investigations.

The laboratory supported the yearly pet food survey and provided support for the investigation of several animal death cases. Microscopical examination continues to be used to monitor the quality and ingredients of feeds. Over 120 regulated fertilizer materials were analyzed for metals of concern to determine if they were adulterated based on AAPFCO guidelines.

Check sample materials were analyzed from regional, national, and international programs: AOCS, AAFCO, Magruder[®], mycotoxins, UAN, AFPC phosphate rock, mineral, and other sample types. The laboratory began participation in the USDA Quality Systems and Services aflatoxin testing check sample program. The laboratory continued to participate in the AOCS mycotoxin and microscopy check sample programs. The laboratory participated in a monthly inter-laboratory aflatoxin share sample program consisting of several state regulatory laboratories. The laboratory routinely provided program support using approximately 65 different analytical methods. Samples were also submitted to and analyzed by commercial laboratories and other regulatory programs to provide additional analytical method support and to ensure the quality of the Regulatory Services laboratory results.

Feed Regulatory Program

F. Jaramillo Jr.

The feed regulatory program provides consumer protection for purchasers of livestock feed and pet food products and monitors a marketplace environment that promotes fair and equitable competition. The Kentucky Commercial Feed Law outlines standards of quality, safety, and efficacy of commercial livestock feed and pet food products through specific labeling requirements. Labels should identify the purpose, a guaranteed composition, ingredient list, and feeding directions as well as warning or caution statements required for proper use. A statewide inspection, sampling, and testing program monitors feed products for accurate labeling.

The feed program is also involved in ensuring safety and suitability of animal feed products fed to livestock and poultry producing meat, milk, and eggs for human consumption. This includes participation in a nationwide effort to ensure food safety and to promote consumer confidence in the food supply. The feed program and the Food and Drug Administration (FDA) work cooperatively to inspect facilities for compliance with the ruminant-to-ruminant feeding ban, which was promulgated to prevent establishment and amplification of bovine spongiform encephalopathy (BSE, or "mad cow disease").

2008 Highlights:

- Collected 3,225 official and 57 unofficial samples of feed involving 19,207 tests to monitor more than 2.2 million tons of commercial feed and feed ingredients distributed in Kentucky.
- Over 600 pet food samples were analyzed for conformance with labeling.
- Performed 355 mycotoxin analyses on various feeds and ingredients.
- In a cooperative program with FDA, our inspectors inspected four feed mills that mix restricted drugs in feed and compliance with the federal BSE regulation. Also for FDA, an additional 60 mills and dealers were inspected for BSE compliance.
- Conducted 12,000 label reviews and maintained product registration for about 18,300 products from nearly 1,100 companies.

Fertilizer Regulatory Program

*D.L. Terry
S.W. McMurry*

The Kentucky Fertilizer Law ensures that fertilizers sold in Kentucky are clearly and accurately labeled so that consumers can make informed purchases of fertilizer with confidence in its quality. The law also protects the legitimate fertilizer industry from unfair competition.

2008 Highlights:

- Administered actions on 2,798 official and 34 unofficial samples of fertilizer involving 8,189 chemical tests.
- The official samples represented about 59,985 tons out of the approximately 846,150 tons of fertilizer distributed in Kentucky during 2008, or about 7%.
- Reviewed labels and registered 4,052 products from 553 firms and issued licenses to 202 companies that manufactured custom-blended fertilizers.

Inspection Program

S. McMurry

The inspection program strives to promote industry compliance with consumer protection laws administered by the Division. Inspectors strategically located throughout the state carry out this responsibility in respective assigned areas. Their primary duty is to visit manufacturing plants, processing facilities, storage warehouses, and retail sites to collect official samples of feed, pet food, fertilizer, milk, and seed. While visiting these firms, inspectors also review records and offer assistance in improving operations to achieve compliance with the laws.

2008 Highlights:

- 10 inspectors completed more than 4,600 feed, fertilizer, and seed inspections of processing, manufacturing, and marketing firms in the state.
- Emphasis in the feed area included feed mill inspections for compliance with FDA's BSE regulations.
- Two inspectors visited and sampled small package specialty feed, fertilizer, and seed products in urban markets.
- Two inspectors made 192 visits to determine compliance with Kentucky's Farm Milk Handler Law.
- Inspectors collected the following official samples for laboratory verification of appropriate constituents and quality:

Feed	3,225
Fertilizer	2,798
Seed	2,317
Milk	3,529

Milk Regulatory Program

C. Thompson

The mission of the milk regulatory program is to ensure that raw farm milk produced and marketed in Kentucky is bought and sold using accurate weights and tests. The program's primary function is to monitor milk handling systems from the time a producer's milk is sampled and weighed, through delivery and laboratory testing, until producer payments are calculated. The program provides support to the producers and processors of Kentucky's \$252 million/year dairy industry. Industry participants are trained, licensed, and subsequently monitored to maintain compliance with the law.

In addition to regulatory functions, the milk program cooperates with other agencies in educational projects to provide a variety of services to Kentucky dairy producers, processors, and allied industries. The milk program also operates a laboratory that is available for Kentucky producer, processor, and handler service testing.

2008 Highlights:

- Reviewed and issued licenses to 4 transfer stations, 23 milk handlers, 20 laboratories, 65 testers, and 352 sampler-weighers (milk-haulers, receivers, and samplers).
- Analyzed and administered action on 3,529 official samples.

- Administered a monthly milk lab quality control check sample program through the distribution of 2,640 check samples to the 20 licensed laboratories to ensure accurate component testing procedures.
- Conducted 18 pay-record and 20 raw milk receiving manifest audits.
- Conducted 34 milk laboratory inspections.
- Collaborated with the Kentucky Cabinet for Health Services Milk Safety Branch to train sampler-weighers and processor receiving personnel.
- Trained and examined 34 new sampler-weighers and 9 new testers.
- Conducted 14 inspections of raw milk transfer stations.
- Conducted 424 sampler-weigher inspections.
- Participated with the Department of Biosystems and Agricultural Engineering (BAE) in a project funded by the Department of Homeland Security (DHS) to develop an electronic security system for securing bulk milk during transport. Teamed with BAE to secure an additional \$1.2 million DHS grant to optimize the prototype system developed from the initial project.

Seed Regulatory Program

D.T. Buckingham

The seed regulatory program ensures Kentucky farmers and urban consumers of quality seed while promoting fair and equitable competition among seed dealers and seedsmen through inspection and analysis of products found in the marketplace. The Division, which administers and implements the Kentucky Seed Law, promotes compliance through facility inspections, sampling, and analysis of seed offered for sale. The law requires proper labeling of seed which includes kind, variety and lot designation, purity percentages, noxious weeds, origin, test date, and a germination guarantee. The Division is also responsible for maintaining registration of seed labelers, seed conditioners, and seed dealers in the state.

2008 Highlights:

- Performed inspections and sampled agricultural, lawn, turf, and garden seeds at more than 500 wholesale and retail locations.
- Collected and tested 2,317 official seed samples.
- Issued stop-sale orders on 338 official seed samples and 246 violative seed lots at seed dealer and seed processor locations.
- Cooperated with the USDA-Seed Branch regarding shipments of seed into the state that were in violation of the Federal Seed Act.
- Reviewed and issued 208 agricultural permits and 40 vegetable and flower permits to label seed.
- Registered 480 seed dealers and 26 non-certified custom conditioners.
- Provided training to firms on labeling requirements, retail sales procedures, stop sale release procedures, and record-keeping requirements.

Seed Testing Laboratory

C. Finneseth

The Division maintains the only seed testing facility in Kentucky. This laboratory conducts all official testing in the state and provides service testing for producers, dealers, retailers, researchers, and homeowners. In 2008, 94 percent of service samples accepted into the laboratory were submitted by Kentucky firms or individuals. Services to customers in 2008 included electronic notification of sample activity and reporting of test results as well as real-time online access to service sample results.

Laboratory capabilities include purity testing, weed and crop seed identification, seed counts, accelerated aging, test weight, fluorescence testing for ryegrass, moisture content, tetrazolium, herbicide tolerance, endophyte, and germination as well as many other tests. In 2008, a new herbicide bioassay, endophyte seed and tiller immunoassays, ELISA testing, and trait testing were added to the suite of analyses offered by the laboratory.

Laboratory analysts participated in regional and national referee testing through the Association of Official Seed Analysts (AOSA) and the USDA Federal Seed Laboratory to ensure inter-laboratory and intra-laboratory quality of test results. All analysts are AOSA-certified in their respective areas of analysis. More than 15,000 individual tests were performed by laboratory personnel in 2008. In addition to routine laboratory activities, the seed program participated in various professional development and educational programs.

2008 Highlights:

Sample Type	Completed Samples
Official samples	2,317
Research samples	644
Service samples	5,430
<i>Kinds of Seed Tested</i>	
Grains	1,697
Grasses	2,215
Vegetables/Edibles	779
Tobacco	1,200
Legumes	1,361
Ornamentals/Other	1,061
Native species	86

<i>Certified Crops</i>	
Tobacco	1,200
Other crops	190
Total Samples	8,391

Laboratory Tests Conducted	
Endophyte	509
Germination	10,166
Purity	4,079
Trait testing	184
Vigor	279
Other	661
Total Analyses	15,878

Soil Testing Laboratory

F.J. Sikora and D. Reid (Lexington)

P. Howe (UKREC, Princeton)

Soil testing provides farmers, homeowners, greenhouse operators, and others with scientific information about the fertility status of their soils or greenhouse media. In partnership with the Cooperative Extension Service, it also provides them with lime and fertilizer recommendations based on laboratory results. We also offer analyses of animal wastes, nutrient solutions, and special research solutions. The soil test Web site is at <http://soils.rs.uky.edu>.

2008 Highlights:

Type	Number	% Change
Agriculture	41,817	22
Home lawn and garden	8,015	16
Commercial horticulture	713	2
Greenhouse media	72	76
Research	9,113	32
Atrazine residue in soil	18	50
Animal waste	370	42
Nutrient solution	83	177
Special research solutions	1,068	-45
Total	61,269	20

Sustainable Agriculture and Food Systems Working Group

The Sustainable Agriculture and Food Systems Working Group evolved from the Food Systems Initiative. The group's mission is to create new knowledge to improve the sustainability of the food system in Kentucky and beyond; to help Kentucky citizens and students understand sustainable agriculture and food systems; and to promote UK's activities as they relate to sustainable agriculture and food systems within the land-grant mission.

Inside the College of Agriculture, the group is taking an inventory of courses, majors, and programs that include aspects of sustainability in an effort to catalog them and work to develop synergy between them. The next step will be to look across the university as a whole and seek synergy across all the colleges and programs. A Web site is in development that will allow quick access to sustainability programs and information for the entire College.

Research Support and Activities

Kentucky Hamburger Alliance

Dr. Lee Meyer, Dr. Gregg Rentfrow, and Bob Perry worked with UK Foodservice and Green River Cattle Company to develop into a working model the idea of an alliance between cattle finishers and beef consumers. Green River Cattle Company will pool meat from Kentucky cattle finishers and make hamburger patties for the university to serve at all its outlets. The program has just begun but shows promise as a way to help the fledgling local beef producers gain market share.

Rebekah Grace Dairy

When UK Foodservice decided to try to utilize all-natural and small-farm produced milk on campus, the working group was able to broker the meeting that made it possible. The group was also able to engage Dr. Melissa Newman and Dr. Joe O'Leary of the Department of Animal and Food Sciences to help with some initial problems the dairy had in scaling up to meet the university's demand.

Taste Panels

Through the working group, taste panels were arranged with some of Kentucky's and the nation's best chefs to taste new varieties of produce grown at the Horticulture Research Farm. The group also took part in the annual Horticulture Field Day and has arranged tours for growers interested in starting organic production.

Market Maker

Members of the working group have been an integral part of the team continuing to develop Kentucky Market Maker, an online searchable directory of all food products available in Kentucky. Market Maker launched Phase II that includes many new features, many of which were initiated from discussions held among the UK team.

Local Food Usage

Whether at farmers' markets and retail outlets or in-school foodservice, restaurants, or institutions, members of the working group continue to receive calls for assistance to develop programs and research infrastructure to facilitate the increased use of locally produced food. Even as the economy has slowed, the interest in locally grown products continues to increase and shows no signs of slowing.

Local Food Network Hub

The Sustainable Agriculture and Food Systems Working Group continues to serve as a network hub between UK researchers, specialists, and Cooperative Extension agents; other universities and colleges nationally and internationally; the Governor's Office of Agricultural Policy; the Kentucky Department of Agriculture; advocacy groups such as Chefs Collaborative, Slow Food USA, Partners for Family Farms, Community Farm Alliance, Sierra Club, the American Grass-fed Association, Community Food Security Coalition; and, most important, the farmers/producers themselves. The working group facilitates communication among these various organizations so that research opportunities are found, information to help producers is distributed, and UK's work in this area is highlighted in local, national, and international publications and media.

The Lexington Community Food Assessment

Dr. Keiko Tanaka (Community and Leadership Development) and Dr. Patrick Mooney (Sociology) continue to work on the Lexington Community Food Assessment project, in collaboration with the Community Farm Alliance and Sustainable Communities Network. In the fall semester, Tanaka and her students in SOC-517, "Rural Sociology," conducted the survey with Lexington consumers (n = 332) at two sites of the Lexington Farmers' Market, Good Foods Market and Café, and two sites of Wal-Mart Supercenter. The survey found a high level of consumer concerns with food-related issues as well as a high level of consumer demand for locally produced food at grocery stores. This work was highlighted in local media.

Tracy Farmer Center for the Environment

The Tracy Farmer Center for the Environment is the University of Kentucky's focal interdisciplinary center for the comprehensive integration of research, education, and public service dedicated to advancing our knowledge and understanding of environmental systems; the analysis and management of environmental problems and issues; the development of sustainable technologies and solutions to these environmental problems and issues; and the successful transfer and dissemination of these technologies to state, federal, and local governments, private organizations, businesses and corporations, and individuals.

The Center exists under the stewardship of the University of Kentucky College of Agriculture. This arrangement affords opportunities to build upon a variety of existing synergies in research, outreach, and education, while presenting the Center with a leadership role in such projects as the SB271 Groundwater Research and Education Program.

The College of Agriculture is committed to continuing the multidisciplinary role the Center plays within both the university and the broader commonwealth, while providing support in areas ranging from staffing to communication and development.

Research Support

Energy Working Group: The Center is working with faculty and staff to build research coalitions and outreach opportunities regarding the many different facets of energy use and the development of alternative energy products.

Invasive Species Working Group: The Center is working with faculty and staff across the state to build partnerships for research and outreach regarding invasive species. The project involves the development of a steering committee, listserv, and a series of

“brown bag” seminars to facilitate communication regarding invasive species. A fall conference was held in December 2008.

Mapping and Monitoring Land Use Change Conference: Working with Kentucky’s Division of Geographic Information and UK’s Department of Landscape Architecture, staff at the Center conducted a statewide remote sensing conference to showcase remote sensing technology and highlight land use changes throughout the state.

Outreach

Bluegrass Partnership for a Green Community: The University of Kentucky, Lexington-Fayette Urban County Government, and Fayette County Public Schools have formed the Bluegrass Partnership for a Green Community, an initiative aimed at stimulating greater regional commitment to environmental issues by government, schools, businesses, private citizens, and young people.

Potential partnership benefits include environmental management cost savings for partners, more resources for joint research, sustainability-related business development opportunities, increased expertise for academic instruction, and improved environmental education possibilities for children and the broader community. Currently, there are 11 teams implementing community-wide projects: energy-efficient buildings, environmental education, transportation, water/storm water, sustainable foods, communications/outreach, recycling, purchasing, green space, and the World Equestrian Games Team.

Primary Partners

- Bluegrass Expo Team
- Lexington-Fayette Urban County Government
- Fayette County Public Schools

Bluegrass Rain Garden Alliance: The Center acquired a grant from Kentucky’s Environment and Public Protection Cabinet to encourage the community to install 2,010 rain gardens throughout the Bluegrass by 2010. Community partners include Bluegrass PRIDE, the Kentucky Department of Fish and Wildlife Resources, EcoGro, CPE Engineers, and Lexington-Fayette Urban County Government.

Center of Excellence for Stream and Wetland Restoration Technology Development and Transfer: The Center is a partner with the United States Forest Service Technology Development Center on the first Center on Excellence created through a memorandum of understanding to share information regarding stream and wetlands restoration, technology, and development.

Bluegrass School Gardens Network: The Center is working with schools and nonprofit organizations to create and maintain gardens at schools throughout Fayette County. Community members are taking a leadership role to bring gardening expertise to Lexington youth.

Kentucky Clean Energy Corps: Staff at the Center are helping multiple state government agencies weatherize low-income homes and design and implement energy efficiency programs for all community stakeholders, including homeowners, students, community members, and volunteers.

Kentucky Girls Science, Technology, Engineering, and Mathematics (STEM) Collaborative: The Center is a major partner in the Kentucky Girls STEM Collaborative, an organization dedicated to inspiring girls to enter STEM courses and careers. The collaborative has conducted a kick-off event and a press event and will have an annual conference in June.

Bluegrass Tomorrow Innovision 2018: The Center is working with Bluegrass Tomorrow on a visioning project for the Bluegrass region.

Education

AWAKE: The All Wild About Kentucky’s Environment (AWAKE) Web site provides visitors with information about Kentucky’s native plants and wildlife, as well as the ecosystems that support them. The AWAKE site (www.kentuckyawake.org) features ready-for-the-classroom units of study designed by Kentucky educators that teach about Kentucky’s natural resources. The Wild About Reading and Writing and Wild About Art portions of the site allow visitors to submit their own creative, nature-related writings, art pieces, and photography. The Web site has something for anyone wanting to learn more about Kentucky’s biodiversity and the environments that support it.

Cane Run Watershed Education: Working with faculty and staff from other departments in the College of Agriculture, such as Biosystems and Agricultural Engineering, the Center is conducting a professional development workshop for elementary-, middle-, and high-school teachers. Community partners include Bluegrass PRIDE, and funding is provided by an EPA grant through the Kentucky Division of Water.

Community-Based Science: The Center has been working on community-based science projects for the past four years with funding from USDA, the Council on Postsecondary Education (CPE), the Kentucky Department of Education, and in 2008, the National Science Foundation. More than 20 teachers and 1,000 students have participated in the community-based research programs that range from water quality to invasive species and the carrying capacity of elk. An extension to the CPE grant is funding a GIS workshop for teachers currently participating in community-based science projects.

National Science Foundation Innovative Technology Experiences for Students and Teachers (ITEST): The Center received \$1.2 million to continue its work in community-based science work with multiple Kentucky counties. Students and teachers are investigating community issues using GIS and 3-D modeling technology.

Council on Postsecondary Education (CPE) Science Literacy for Middle School Teachers: The Center will be working with 10 teams of middle-school science and language arts teachers on a grant from CPE to improve students’ literacy in science. The teachers will investigate numerous science topics through 21st Century Literacy Skills.

Kentucky Universities Partnership for Environmental Education: The Kentucky University Partnership for Environmental Education (KUPEE) is a collaborative group of centers for environmental

education located at all Kentucky state universities. The partnership's mission is to increase the environmental literacy of all citizens of the commonwealth through environmental education to assure the protection and sustainable development of Kentucky's natural and cultural resources.

Primary Partners

- Eastern Kentucky University
- Kentucky State University
- Morehead State University
- Murray State University
- Northern Kentucky University
- University of Louisville
- University of Kentucky
- Western Kentucky University
- Kentucky Environmental Education Council

Natural Resource Academy for Urban Youth: The Center partnered with the Lincoln Foundation, Jefferson County Public Schools, and the University of Louisville to conduct a natural resource academy for 50 high-school youth from Jefferson County. During the culminating week, 26 students did field work at Robinson Forest.

Community-Based Science for Students: The Center's Community-Based Science Program for Students and Teachers partners faculty and staff from the University of Kentucky with students and teachers. It combines relevant, job-embedded teacher professional development with year-long student explorations of real-life community science problems relevant to Kentucky. The project goal is to enhance teacher content knowledge, science process skills, the understanding of the nature of science, and the integration of core content areas, especially mathematics and literacy, into the community-based science projects and the science curriculum through a one-week, high-quality, job-embedded professional development opportunity with year-long follow-up. Seven hundred students and 20 teachers are investigating five different community science problems alongside UK and other community experts.

Primary Partners

- Kentucky School Districts
- Kentucky Department of Education
- Kentucky Institute for the Environment and Sustainable Development
- Kentucky Department of Fish and Wildlife Resources
- Three Chimneys Farm
- Taylor Made Farm
- Rood and Riddle
- Kentucky Nature Preserves Commission

Professional Development for Educators: In cooperation with a wide variety of partners, the Center provides professional development opportunities for formal and non-formal educators across the commonwealth. These workshops have included such topics as water, air quality, and aquatic biodiversity.

Primary Partners

- Bluegrass PRIDE
- Campbellsville University
- Eastern Kentucky University
- Kentucky Department of Agriculture
- Kentucky Division of Forestry
- United States Forest Service
- University of Louisville
- University of Kentucky Cooperative Extension Service
- Kentucky Division of Water
- Governor's Office of Energy Policy
- Equitable Foundation
- NEED Project
- Louisville Gas and Electric

Kentucky Agricultural Experiment Station Projects

Hatch, McIntire-Stennis, and Animal Health Projects

Hatch, McIntire-Stennis, and Animal Health projects for calendar year 2008, as reported in the USDA Current Research Information System (CRIS) database, follow.

Agricultural Economics

- Agricultural and Rural Finance Markets in Transition—*Katchova, A.*
- Consumer Choice Regarding Food and Health—*Maynard, L.J.*
- Economic Impacts of International Trade and Domestic Policies on Southern Agriculture—*Reed, M.R.*
- Economics of Precision Agricultural Machinery Management—*Dillon, C.*
- Effects of Policy and Product Changes on the International Demand for U.S. Agricultural Products—*Reed, M.R.*
- Ex-Post Evaluations of Environmental Projects That Affect Kentucky Agriculture and Rural Communities—*Pagoulatos, A.*
- Family Firms and Policy—*Pushkarskaya, H.N.*
- Impact of Food Safety Scares on the Food Supply Chain in an Environment of Highly Integrated Monopolistically Competitive Agriculture and Food Industries—*Saghaian, S.H.*
- Impacts of Social Capital on the Economic Development and Well-Being of Rural Areas—*Debertin, D.L.*
- Impacts of Trade and Domestic Policies on the Competitiveness and Performance of Southern Agriculture—*Reed, M.R.*
- Nanotechnology and Biosensors—*Hu, W.*
- Rural Change: Markets, Governance, and Quality of Life—*Freshwater, D.*

Animal and Food Sciences

- Antioxidative Properties of Hydrolyzed Protein in Muscle Foods—*Xiong, Y.L.*
- Assessment and Implications of Carbohydrate Utilization in the Small Intestine of Beef Cattle—*Harmon, D.L.*
- Assessment and Regulation of Sexual Behavior in Beef Bulls—*Schillo, K.K.*
- Characterization of Enzyme(s) Associated with Sulfur Assimilation Type Reactions in Soy Protein Products—*Boatright, W.L.*
- Control of Food-Borne Pathogens in Pre- and Post-Harvest Environments—*Newman, M.*
- Development of Peptides to Enhance Cheese Production and Bio-Active Probes—*Hicks, C.L.*
- Elucidating Aldehyde-Induced Redox Instability in Carboxymyoglobin—*Suman, S.*
- Enteric Diseases of Swine and Cattle: Prevention, Control, and Food Safety—*Newman, M.C.*
- Factors Affecting Forage Intake and Utilization by Horses—*Lawrence, L.M.*
- Factors Affecting Small Intestinal Carbohydrate Assimilation in Beef Cattle—*Harmon, D.L.*
- Genetic (Co) Variance of Parasite Resistance, Temperament, and Production Traits of Traditional and Non-*Bos indicus* Tropically Adapted Breeds—*Thrift, F.A.*

- Genetic Selection and Crossbreeding to Enhance Reproduction and Survival of Dairy Cattle—*McAllister, A.J.*
- Grading Up to Hair Sheep Genetics in a Low-Input Production System—*Aaron, D.K.*
- Improving the Sustainability of Livestock and Poultry Production in the United States—*Cronwell, G.L.*
- Metabolic Relationships in Supply of Nutrients for Lactating Cows—*McLeod, K.R.*
- Methods to Increase Reproductive Efficiency in Cattle—*Silvia, W.J.*
- Nitrogen Cycling, Loading, and Use Efficiency in Forage-Based Livestock Production Systems—*Vanzant, E.S.*
- Nutritional and Management Abatement Strategies for Improvement of Poultry Air and Water Quality—*Cantor, A.H.*
- Nutritional Modulation of the Vascular Endothelium—*Hennig, B.*
- Nutritional Systems for Swine to Increase Reproductive Efficiency—*Lindemann, M.D.*
- Post-Genomic Characterization of Anaerobic Bacterial Metabolism—*Strobel, H.J.*
- Regulated Expression of Genes/Proteins Critical to Anionic Amino Acid N Metabolism by Developing and Aging Beef Cattle—*Matthews, J.C.*
- Regulation of Estrous Behavior in Dairy Cows—*Silvia, W.J.*

Biosystems and Agricultural Engineering

- Characterization of Laboratory and Pilot Scale Foam Fractionation of Industrial Enzymes—*Crofcheck, C.L.*
- Developing and Integrating Components for Commercial Greenhouse Production Systems—*Gates, R.S.*
- Improvement of Thermal and Alternative Processes for Foods—*Payne, F.A.*
- Management of Grain Quality and Security for World Markets—*Montross, M.D.*
- Marketing and Delivery of Quality Grains and Bio-Process Coproducts—*Montross, M.D.*
- Modeling for TMDL Development, and Watershed Based Planning, Management and Assessment—*Edwards, D.R.*
- Precision Placement of Crop Production Inputs via Distributed Control—*Shearer, S.A.*
- Soil Productivity as Affected by Mechanical Influence—*Wells, L.G.*
- Stream/Aquifer Interface: Understanding the Riparian Corridor—*Workman, S.R.*
- Stress Factors of Farm Animals and Their Effects on Performance—*Gates, R.S.*
- Systems for Controlling Air Pollutant Emissions and Indoor Environments of Poultry, Swine, and Dairy Facilities—*Gates, R.S.*
- Wood Utilization Research on U.S. Biofuels, Bioproducts, Hybrid Biomaterials Composites Production, and Traditional Forest Products—*Nokes, S.E.*

Community and Leadership Development

- Research and Education Support for the Renewal of an Agriculture of the Middle—*Tanaka, K.*
- Rural Low-Income Families: Tracking Their Well-Being and Function in an Era of Welfare Reform—*Dyk, P.H.*

Entomology

- A National Agricultural Program to Clear Pest Control Agents for Minor Uses—*Bessin, R.T.*
- Bed Bug Biology and Behavior—*Haynes, K.*
- Biological Control in Pest Management Systems of Plants—*Harwood, J.D.*
- Biological Control of Arthropod Pests and Weeds—*Yeagan, K.V.*
- Biological Improvement, Habitat Restoration, and Horticultural Development of Chestnut by Management of Populations, Pathogens, and Pests—*Rieske-Kinney, L.K.*
- Biological Improvement of Chestnut through Technologies That Address Management of the Species, Its Pathogens, and Pests—*Rieske-Kinney, L.K.*
- Biology and Management of Insects Attacking Turf and Woody Landscape Plants—*Potter, D.A.*
- Biology, Impact, and Management of Soybean Insect Pests in Soybean Production Systems—*Yeagan, K.*
- Ecology and Management of European Corn Borer and Other Lepidopteran Pests of Corn—*Obrycki, J.*
- Effects of Prey Biodiversity on Pest Regulation by Generalist Predators—*Harwood, J.D.*
- Exotic Organisms Interact to Influence Persistence of a Native Species: Potential Interplay between the Asian Chestnut Gall Wasp and Its Chestnut Hosts—*Rieske-Kinney, L.K.*
- Genomic Approaches to Analyses of Immune-Suppressive Genes of the *Campoplex sonorensis* Polydnavirus—*Webb, B.A.*
- Herbivory in Deciduous Forests: Implications for Forest Regeneration and Restoration—*Rieske-Kinney, L.K.*
- Improved Methods to Combat Mosquitoes and Crop Pests in Rice Fields—*Dobson, S.L.*
- Inbreeding and the Fitness Consequences of Colonizing Novel Environments in Herbivorous Insects—*Fox, C.W.*
- Interactions among Bark Beetles, Pathogens, and Conifers in North American Forests—*Rieske-Kinney, L.K.*
- Molecular Analysis of Pest Development and Resistance to Insecticides—*Palli, S.R.*
- Mosquitoes, Disease, and Public Health—*Dobson, S.L.*
- Phylogeny and Biodiversity of Hymenopteran Biological Control Agents—*Sharkey, M.*
- Potential for Evolution of Resistance to Synthetic Pheromone—*Haynes, K.F.*
- Research and Development Leading to an Integrated Mosquito Management Program for Kentucky—*Brown, G.C.*

Forestry

- Assessing the Invasion Pattern of Exotic Plants in Forest Ecosystems in Kentucky—*Fei, S.*
- Distribution and Ecology of the North American River Otter (*Lontra canadensis*) in Kentucky—*Lacki, M.J.*
- Evaluating Streamside Management Zone Effectiveness in Forested Headwater Catchments of Central Appalachia—*Barton, C.*
- Prescribed Fire in the Southern Appalachians: Stand Structure, Oak Seedlings, and Fuel—*Arthur, M.A.*

RREA Program—*Stringer, J.W.*
The Ecological Role of Large Mammals in the Forests of Kentucky and the Eastern United States: Implications for Conservation—*Cox, J.*
Use of Underplanting to Enhance the Health and Sustainability of Oak-Dominated Ecosystems in Kentucky and the Central Hardwood Region —*Lhotka, J.*

Horticulture

Chemical Genetic Dissection of Plant Cellulose Synthesis—*DeBolt, S.*
Environmental and Genetic Determinants of Seed Quality and Performance—*Downie, A.B.*
Improving Economic and Environmental Sustainability in Tree-Fruit Production through Changes in Rootstock Use—*Archbold, D.D.*
Marketing, Managing, and Producing Environmental Plants in a Technical and Economically Efficient Manner—*Ingram, D.*
Mechanism and Significance of Post-Translational Modifications in the Large (LS) and Small (SS) Subunits of Rubisco—*Houtz, R.L.*
Multi-State Evaluation of Wine Grape Cultivars and Clones—*Kurtural, K.*
New Horticultural and Grain Crop Opportunities for Kentucky—*Ingram, D.*
Optimizing the Water and Air Relationship and Nutrient Concentration in a Controlled Water Table Irrigated Container Growing Medium—*Buxton, J.W.*
Peptide Deformylase: A Novel Herbicide Target Amenable to Genetically Engineered Tolerance—*Williams, M.*
Regulation of Expression and Activity of Sorbitol Dehydrogenase in Apple—*Archbold, D.*
Spider Mite Resistance Mechanisms in *Lycopersicon hirsutum* Accession LA2329—*Snyder, J.*
The Role of Ethylene and Polyamine Interaction in the Time to Radicle Protrusion during Seed Germination—*Geneve, R.L.*

Human Environmental Sciences

Antioxidant Nutrients, Reactive Oxygen Species, and Oxidative Stress—*Chow, C.K.*
Dietary Antioxidants, NF- κ B, and Carcinogenesis—*Glauert, H.P.*
Dietary Selenium and Carcinogenesis by Environmental Agents—*Glauert, H.*
EFNEP Related Research, Program Evaluation and Outreach—*Forsythe, H.E.*
Interactions of Individual, Family, Community, and Policy Contexts on the Mental and Physical Health of Diverse Rural Low-Income Families—*Simmons, L.A.*

Livestock Disease Diagnostic Center

Regional Animal Health Situational Awareness Project—*Carter, C.N.*

Plant and Soil Sciences

Breeding and Genetics of Forage Crops to Improve Productivity, Quality, and Industrial Uses—*Phillips, T.D.*
Breeding Sweet Sorghum for Syrup Production—*Pfeiffer, T.W.*
Characterizing Active Soil Organic Matter Pools Controlling Soil N Availability in Maize-Based Cropping Systems—*Grove, J.H.*
Characterizing Mass and Energy Transport at Different Scales—*Wendroth, O.O.*

Determining Impact of Lower Soybean Plant Populations on Other Practices within the Soybean Production System—*Lee, C.*
Development of Weed Management Strategies in Agronomic Crops—*Witt, W.W.*
Effect of Urease Inhibitors on Volatile N Loss from Soil and Other N Transformations—*Coyne, M.S.*
Endophyte Effects on the Structure and Function of Tall Fescue Pasture—*McCulley, R.L.*
Evaluation of Soybean Varieties for Use in Kentucky—*Pfeiffer, T.W.*
Fate and Ecological Effects of Livestock Antibiotics in Soils—*D'Angelo, E.*
Fate, Transport, and Ecological Effects of Livestock Antibiotics in Manure-Amended Agroecosystems—*D'Angelo, E.M.*
Hydropedology: Genesis, Properties, and Distribution of Hydromorphic Soils—*Karathanasis, A.D.*
Identification of Soybean Flowering Pathway Genes Using E Gene Near Isogenic Lines—*Kumudini, S.*
Messenger RNA 3 Prime End Formation in Plants—*Hunt, A.G.*
Metabolic Studies and Bioengineering of Plant Trichomes towards Enhancing Pest/Disease Resistance and Facilitating Molecular Farming—*Wagner, G.J.*
Mineral Controls on P Retention and Release in Soils and Soil Amendments—*Karathanasis, A.D.*
Performance of Small Grain Varieties in Kentucky—*Van Sanford, D.A.*
Plant Genetic Resources Conservation and Utilization—*Phillips, T.D.*
Positional Cloning and Characterization of RCT1, an Anthracnose Resistance Gene in Medicago—*Zhu, H.*
Regulation of Gene Expression during Plant Embryogenesis—*Perry, S.E.*
Regulation of Reproductive Sink Size in Soybean (*Glycine max* L. Merrill)—*Egli, D.B.*
Roles of MicroRNA Structures in Plant RNA Silencing—*Tang, G.*
Seed Germination Ecology of Hawaiian Montane Species—*Baskin, C.*
Soil Survey Characterizations and Interpretations for Kentucky Soils—*Karathanasis, A.D.*
Spatial and Temporal Characteristics of Grassland Agroecosystems—*Dougherty, C.T.*
Triacylglycerol Biosynthesis in Soybeans—*Hildebrand, D.*
Turfgrass Management Practices in Kentucky—*Williams, D.W.*
Unraveling the Catalytic Specificity of Terpene Hydroxylases and Engineering Sesquiterpene Hydroxylation in Plants—*Chappell, J.*
Weed Management Strategies for Sustainable Cropping Systems—*Grabau, L.J.*

Plant Pathology

Biochemistry and Genetics of Plant-Fungal Interactions—*Vaillancourt, L.*
Characterization of R-Gene-Mediated Signaling and Cross Talk between Defense Signaling Pathways—*Kachroo, P.*
Characterization of Resistance Gene-Mediated Signaling and Role of Oleic Acid and Glycerol 3-Phosphate in Plant Defense—*Kachroo, P.*
Defining RNA and Protein Factors Affecting Tombusvirus Replication—*Nagy, P.D.*

Dissecting Defense Signaling Pathways in Soybean and Arabidopsis—*Kachroo, A.*
Ecological and Genetic Diversity of Soilborne Pathogens and Indigenous Microflora—*Seebold, K.W.*
Genes Controlling Invasive Growth in the Rice Blast Fungus *Magnaporthe oryzae*—*Farman, M.L.*
Genomics of Fungal Endophytes and Their Host Grasses—*Schardl, C.L.*
Genomics, Molecular Biology, and Cell Biology of Sonchus Yellow Net Virus, a Plant Rhabdovirus—*Goodin, M.M.*
Molecular Genetics of the Interaction between Corn and Corn Stalk Rot Fungi (*Colletotrichum graminicola* and *Fusarium graminearum*)—*Vaillancourt, L.J.*
Mycotoxins: Biosecurity and Food Safety—*Vaillancourt, L.J.*

Veterinary Science

Cartilage-Specific Fibronectin Isoform—*MacLeod, J.N.*
Control of Equine Infectious Anemia (EIA)—*Issel, C.J.*
Control, Transmission, and Prevalence of Natural Infections of Internal Parasites of Equids and Ruminants—*Lyons, E.T.*
Effect of Aging on the Immune Response of Horses—*Horohov, D.W.*
Evaluation of Bacterial Endophytes of Grass and Legume Forages as Emerging Causes of Reproductive Loss—*Swercek, T.W.*
High Sensitivity Analytical/Toxicological Approaches to Problems in Equine Medicine—*Tobin, T.*
Immunologic Requirements for Vaccine Mediated Prevention of Equine Herpesvirus Neurologic Disease—*Horohov, D.W.*
Innate Immune Responses to Influenza Virus Infection—*Chambers, T.*
Insulin Resistance in the Horse: Induction, Duration, and Effects on the Estrous Cycle of the Mare—*Fitzgerald, B.P.*
Interferon Gamma Regulation in the Foal—*Horohov, D.W.*
Investigation of the SnSAG Gene Family of Surface Antigens in the Coccidian Parasite *Sarcocystis neurona*—*Howe, D.K.*
Molecular Basis of Attenuation of the Modified Live Virus Vaccine Strain of Equine Arteritis—*Balasuriya, U.*
Molecular Mechanisms, Ecology, and Control of Natural Infections of Equids and Ruminants by Drug-Resistant Internal Parasites—*Lyons, E.T.*
National Animal Genome Research Program—*Bailey, E.*
National Animal Genome Research Program (from NSRP-8)—*Bailey, E.*
National Animal Genome Research Program Species Coordinator for the Horse—*Bailey, E.*
Novel, Protectively Immunogenic, Surface-Exposed, and Secreted Proteins of *Streptococcus equi*—*Timoney, J.F.*
Pregnancy Maintenance in Mares—*McDowell, K.J.*
Vasomodulatory Effects of Endophyte-Infected Tall Fescue in Horses—*McDowell, K.J.*

Collegewide Extramural Funding

This information, generated from the Office of Sponsored Projects Administration database, includes any award with a start date within the reporting period (January 1, 2008–December 31, 2008) and any budgetary addition or reduction to existing projects processed within the reporting period. The grant is listed under the department of the Principal Investigator.

Agricultural Economics

Total—\$ 601,255

- Advanced Master Cattleman, Kentucky Beef Network, \$154,560—*Burdine, K., Anderson, L., Bullock, K., Meyer, A.*
- Agent Training for the Development of a Program in Farm Transitions, University of Georgia, \$8,528—*Meyer, A.*
- Annie's Project: Risk Management Education for Kentucky Farm Women, Texas A&M University, (\$9,981)—*Meyer, A., Badenhop, S., Halich, G., Hunter, J.*
- Cooperatives Intern Program, Kentucky Center for Cooperative Development, \$5,000—*Woods, T.*
- Food Safety versus Allegiance to Ranchers: Canadian Consumer Response to Three BSE Events, International Council for Canadian Studies, \$9,500—*Maynard, L.*
- Improving Competitiveness in the Tobacco Global Market through Information Channels and Decision-Making Tools, Tobacco Education and Research Council Inc., \$75,964—*Snell, W.*
- Kentucky Agricultural Development Board: Pilot Farm Management Cost-Share Program, Kentucky Governor's Office of Agricultural Policy, \$500—*Robbins, L.*
- Kentucky's Sustainable Agriculture Research and Education (SARE) 2008-2009 Model State Program and Professional Development Program Plan of Work, University of Georgia, \$10,000—*Meyer, A.*
- Online Math Modules, Cooperative State Research Education and Extension, \$142,756—*Pushkarskaya, H.*
- Program Evaluation of the Agricultural Development Board Investments, 2001-2006, Kentucky Governor's Office of Agricultural Policy, \$74,760—*Infanger, C., Maurer, R., Palmer, G.*
- Scholarships for Thai Ministry of Agriculture Officials, Thai Ministry of Agriculture and Cooperatives, \$7,201—*Reed, M.*
- Supporting and Enhancing the Role of SARE in Extension and Other Land-Grant University Programs, University of Georgia, \$51,169—*Meyer, A.*
- Sustainable Agriculture Research and Education (SARE) Model State Program Assistant, University of Georgia, \$20,000—*Meyer, A.*
- Technical Assistance to the Extension System in Serbia, Foreign Agricultural Service, \$20,389—*Reed, M.*
- The Norman E. Borlaug International Agricultural Science and Technology Fellows Program for El Salvador, Department of Agriculture, \$13,000—*Reed, M.*
- Using MarketMaker Demographics Tools to Estimate Market Potential for Value-Added Agriculture Products, Iowa State University, \$17,909—*Woods, T.*

Agriculture Programs

Total—\$ 236,043

- Addressing Animal and Agriculture Issues in Community Emergency Planning, Cooperative State Research Education and Extension, \$43,941—*Husband, A., Yeagan, R.*
- Developing Online Web Courses for Distance Education on Tobacco, Tobacco Education and Research Council Inc., \$74,000—*Henning, J., Palmer, G., Yeagan, R.*
- Kentucky Agriculture Agent Professional Development: Attending the 2008 Tobacco Workers Conference, Tobacco Education and Research Council Inc., \$10,000—*Henning, J.*
- Strengthening Community Agrosecurity Planning, New Mexico State University, \$38,500—*Husband, A., Yeagan, R.*
- University of Kentucky Cooperative Extension Service Liaison, Kentucky Natural Resources Environmental Protection Cabinet, \$23,701—*Henning, J.*
- University of Kentucky Cooperative Extension Service Liaison, Kentucky Natural Resources Environmental Protection Cabinet, \$45,901—*Palmer, G.*

Animal and Food Sciences

Total—\$ 4,761,801

- Animal Health Sensing and Surveillance: Early Disease Detection for Food Supply and Public Health Protection, National Institute for Hometown Security, \$906,841—*Vanzant, E., Carter, C.*
- Characteristics and Eating Quality of Bacon, Sausage, and Boneless Chops from Finishing Pigs Fed Medium and High Levels of Distillers Dried Grains with Solubles (DDGS), National Pork Board, \$46,161—*Cromwell, G., Lindemann, M., Rentfrow, G.*
- DAIREXNET: A National Dairy Information and Communications Resource, University of Nebraska, \$15,000—*Amaral-Phillips, D., McAllister, A.J.*
- Developing Nutrient Requirement and Feeding Guidelines, Department of Agriculture, \$5,000—*Cromwell, G.*
- Differentiating Sarcoplasmic Proteomes of Color-Stable and Color-Labile Beef Muscles, Cooperative State Research Education and Extension, \$99,999—*Suman, S.*
- Evaluation of Potential Alternatives to Methyl Bromide Fumigation in Dry Cured Ham and Aged Cheese Production, Mississippi State University, \$14,446—*Rentfrow, G.*
- Formation and Reactivity of Carbon-Centered Radicals in Isolated Soy Proteins, Cooperative State Research Education and Extension, \$424,884—*Boatright, W.*
- Impact of Fibrous Feedstuff on Marker Appearance and Disappearance and on Nutrient Digestibility in Finishing Pigs, Agricultural Research Service, \$20,000—*Lindemann, M.*
- Integrated Resource Management, Kentucky Beef Network, \$215,500—*Anderson, L., Bullock, K., Burris, W.*

- Interactive Effects of Concentrate Starch and Soluble Fiber Levels on the Glucose and Insulin Responses of Horses, Cooperative Research Farms, \$41,400—*Lawrence, L.*
- Investigating the Use of Ginger Extract to Improve Tenderness of Beef Biceps Femoris, Kentucky Beef Council, \$20,000—*Suman, S., Rentfrow, G., Xiong, Y.*
- Master Cattleman Program, Kentucky Cattleman's Association, \$252,138—*Burris, W., Anderson, L., Henning, J.*
- Master Grazer Educational Program Part II, Kentucky Beef Network, \$177,791—*Amaral-Phillips, D., Burris, W., Johns, J., Lacefield, G., Scharko, P., Smith, S.*
- National Beef Cattle Evaluation Consortium, Cornell University, \$50,000—*Bullock, K.*
- Nutrition and Superfund Chemical Toxicity, National Institute of Environmental Health Sciences, \$1,941,662—*Hennig, B., Gaetke, L.*
- Postdoctoral Fellow Sponsorship, Alltech Biotechnology Inc., \$103,425—*Pescatore, A.*
- Role of Protein Oxidation in Water-Binding and Hydration of Meat, Cooperative State Research Education and Extension, \$293,654—*Xiong, Y.*
- Sensory Evaluation of Prawns from Different Genetic Strains, Kentucky State University, \$15,000—*Xiong, Y.*
- Student Sponsorship, Alltech Biotechnology Inc., \$26,500—*Cantor, A.*
- Student Sponsorship, Alltech Biotechnology Inc., \$30,000—*Harmon, D.*
- Student Sponsorship, Alltech Biotechnology Inc., \$30,000—*Lawrence, L.*
- Student Sponsorship, Alltech Biotechnology Inc., \$32,400—*Pescatore, A., Quant, A.*

Associate Dean/Director

Total—\$ 1,481,273

- Acquisition of Goods and Services for USDA Offices in Ag North 2008-2009, Agricultural Research Service, \$34,764—*Cox, N.*
- ARS/SCA Cooperative Agreement, Agricultural Research Service, \$5,590—*Cox, N.*
- Equine Medical Director, Kentucky Horse Racing Authority, \$487,426—*Cox, N.*
- Equine Trust Fund, Kentucky Council on Postsecondary Education, \$80,000—*Cox, N.*
- Improving Sustainability of Forage-Based Production, Agricultural Research Service, \$873,493—*Cox, N.*

Biosystems and Agricultural Engineering

Total—\$ 2,895,567

- CNH Master Agreement, Case New Holland America LLC, \$97,579—*Shearer, S.*
- Cooperative Extension Radon and Indoor Air Quality Education, Kentucky Health Services Cabinet, \$(15,800)—*Fehr, R.*
- Energy—A Cooperative Extension Program for Kentucky's Building Systems Energy Needs, Kentucky Office of Energy Policy, \$95,651—*Fehr, R.*

Feeding and Altering Diets for Egg-Laying Hens, United Egg Producers Inc., \$24,065—*Gates, R.*
 International Education and Training for Food, Fiber, and Energy Production, Cooperative State Research Education and Extension, \$100,000—*Workman, S., Gates, R., Stombaugh, T.*
 On-Farm Water Enhancement Program for a Forage Area, Fayette County Conservation District, \$1,500—*Higgins, S.*
 On-Farm Water Enhancement Program for a Spring Development, Fayette County Conservation District, \$5,000—*Higgins, S.*
 Precision Agriculture: Precision Resource Management Phase IV, Cooperative State Research Education and Extension, \$468,551—*Shearer, S., Cox, J., Dillon, C., Dzialak, M., Fei, S., Green, J., Grove, J., Lee, B., Luck, J., Paratley, R., Sama, M., Stombaugh, T., Zandonadi, R.*
 Radon: Cooperative Extension Radon and Indoor Air Quality Education, Kentucky Health Services Cabinet, \$89,200—*Fehr, R.*
 Renewable Energy/Energy Efficiency (REEE) Program Support, Kentucky Office of Energy Policy, \$54,520—*Colliver, D.*
 Solar Decathlon—2009, National Renewable Energy Laboratory, \$100,000—*Colliver, D.*
 Stream Restoration in Guy Cove II, Kentucky Department of Fish and Wildlife, \$516,824—*Agouridis, C., Barton, C., Warner, R.*
 Syneresis Sensor Technology Development for Curd Moisture Content Control, Cooperative State Research Education and Extension, \$182,996—*Payne, F., Castillo, M., Hicks, C.*
 Technology Optimization of a Milk Transport Security System, National Institute for Hometown Security, \$1,175,481—*Payne, F., Thompson, C.*

Community and Leadership Development

Total—\$ 37,355

Engaging Youth, Serving Community (EYSC5) Initiative, National 4-H Council, \$355—*Jones, K.*
 Engaging Youth, Serving Community (EYSC6) Initiative, National 4-H Council, \$25,000—*Jones, K.*
 The Kentucky Citizen Media Project: The Lexington Commons (via New Voices), American University, \$12,000—*Nah, S.*

Entomology

Total—\$ 2,287,307

Alternative Insecticides for Management of Stink Bugs on Bell Peppers and IR-4 State Liaison, University of Florida, \$6,750—*Bessin, R.*
 A Molecular Approach to Elucidate the Role of Invasive Mollusk Pests in Kentucky Agriculture, Kentucky Science and Technology Co. Inc., \$95,733—*Harwood, J.*
 Application of Molecular Techniques for Detection of Prey of Insectivorous Bats, BAT Conservation International, \$3,000—*Rieske-Kinney, L., Dodd, L.*
 Cooperative Agricultural Pest Survey, Animal and Plant Health Inspection Service, \$214,140—*Obrycki, J., Lensing, J.*
 Development of a New Production System for Baculovirus Pesticides, ParaTechs Corp., \$10,000—*Potter, D.*

Emerald Ash Borer Survey and Outreach in Kentucky, Animal and Plant Health Inspection Service, \$499,995—*Obrycki, J., Lensing, J.*
 Enhancement of the Baculovirus Expression Vector System, ParaTechs Corp., \$271,255—*Webb, B.*
 Eradication of a Primary Filariasis Vector Population at an Endemic Field Site, National Institute of Allergy and Infectious Diseases, \$310,665—*Dobson, S.*
 Evaluation of Transgenic Turfgrasses for Resistance to Root-Feeding White Grubs, Dow AgroSciences, \$26,530—*Potter, D.*
 Genetic Modification of Mosquito Populations to Make Them Incapable of Transmitting Dengue Virus, University of Queensland, \$80,504—*Dobson, S.*
 Intraguild Predation between Aphidophagous Lady Beetles: Chemical Perspectives on Community Effects, Cooperative State Research Education and Extension, \$211,000—*Obrycki, J., Haynes, K., Sloggett, J.*
 Light Brown Apple Moth National Survey, Animal and Plant Health Inspection Service, \$68,565—*Obrycki, J., Lensing, J.*
 Migration Patterns for Aphid Pests of Small Grains as Indexed by Capture in an Aphid Suction Trap—Resubmission for Year 2 (FY09), Kentucky Soybean Promotion Board, \$2,388—*Johnson, D.*
 Migration Patterns for Aphid Pests of Small Grains as Indexed by Capture in an Aphid Suction Trap (Year 3), Kentucky Small Grain Growers Association, \$2,404—*Johnson, D.*
 Molecular Analysis of Juvenile Hormone Action, National Institute of General Medical Sciences, \$193,429—*Palli, S.*
 Monitor Gypsy Moth Populations for Slow-the-Spread Program, Slow-the-Spread Foundation, \$50,000—*Obrycki, J., Harper, C.*
 SMARTSTAX and YieldGard VT PRO Evaluations, Monsanto Co., \$7,200—*Bessin, R.*
 State Contact and IPM Documents for Kentucky, North Carolina State University, \$24,000—*Lucas, P.*
 Sustainable Management for Scarab Pests Impacting Grape Production in the Southern Region, University of Georgia, \$9,750—*Potter, D., Hammons, D.*
 TIGER: Thailand Inventory Group for Entomological Research, National Science Foundation, \$199,999—*Sharkey, M.*

eXtension

Total—\$ 557,913

ECOP/CSREES eXtension—Supplement, University of Nebraska, \$251,000—*Wood, C., Craycraft, C.*
 HorseQuest—National Equine Resource Team, University of Nebraska, \$11,000—*Griffin, A.*
 The Transformation of Cooperative Extension, University of Nebraska, \$295,913—*Craycraft, C., Wood, C.*

Extension Field Programs

Total—\$ 123,000

Extension and Arts Grant, Kentucky Arts Council, \$10,000—*Jacobs, C.*
 Family Consumer Science Program Assistant for Environmental Education, Steele Reese Foundation, \$113,000—*Adkins, G.*

Family and Consumer Sciences

Total—\$ 1,008,404

Food Stamp Nutrition Education ZABE, Kentucky Health Services Cabinet, \$343,470—*Vail, A., Stephenson, L.*
 Health Education Leadership, Kentucky, Cooperative State Research Education and Extension, \$602,473—*Vail, A.*
 Kentucky Food Stamp Nutrition Program, Kentucky Families and Children Cabinet, \$43,039—*Vail, A., Stephenson, L.*
 Kentucky Healthy Homes and Communities, Auburn University, \$5,500—*Adler, L.*
 Kentucky Operation: Military Kids, Kansas State University, \$100,000—*Ashurst, K.*

Family Studies

Total—\$ 235,882

Healthy Marriage Child Support Community Demonstration Program, Kentucky Health Services Cabinet, \$192,662—*Werner-Wilson, R., Carlton, E., Vail, A.*
 Healthy Marriage Child Support Community Demonstration Program, Kentucky Health Services Cabinet, \$33,220—*Vail, A., Carlton, E., Werner-Wilson, R.*
 Teacher Educators' Professional Development Grant—FY 09, Kentucky Department of Education, \$10,000—*Mimbs, C., Ellington, V., Hains, B., Horstmeier, R., Kitchel, T.*

Forestry

Total—\$ 479,157

American Chestnut Restoration on Surface-Mined Sites in Appalachia, American Chestnut Foundation, \$25,000—*Barton, C.*
 Calf Survival, Meningeal Worm Impacts Dispersal and Population Expansion in an Eastern Kentucky Elk Herd, Kentucky Department of Fish and Wildlife, \$70,000—*Cox, J.*
 Cerulean Warbler and Golden Winged Warbler Status and Distribution in Kentucky, Fish and Wildlife Service, \$13,264—*Maehr, D.*
 Crosswalk and Develop GIS Mapping Applications and Accomplishment Monitoring Geospatial Database, Kentucky Environmental and Public Protection Cabinet, \$15,000—*Fei, S.*
 Development of Property Tax Assessment Guidelines for Woodland Owners in Kentucky, Kentucky Environmental and Public Protection Cabinet, \$24,100—*Cushing, T.*
 Effects of Silvicultural Treatments on Insect Prey and Activity Levels of Forest-Dwelling Bats in the Central Appalachians, National Council for Air and Stream Improvement Inc., \$40,000—*Lacki, M., Dodd, L., Rieske-Kinney, L.*
 Evaluating Seedling Development, Stand Structure, and Understory Microenvironment Six Growing Seasons Following Midstory Removal, Forest Service, \$5,683—*Lhotka, J., Stringer, J.*
 Fire in the Southern Appalachians: Fuels, Stand Structure, and Oaks, Part II, Forest Service, \$108,000—*Arthur, M.*
 Forest Biomass Training for Kentucky, University of Georgia, \$17,000—*Connors, T., Stringer, J.*

Forest Stewardship Public Awareness, Publicity, and Training, Kentucky Environmental and Public Protection Cabinet, \$20,000—*Stringer, J.*

Kentucky Woodland Magazine Special Forest Health Issue, Kentucky Environmental and Public Protection Cabinet, \$20,000—*Stringer, J.*

Kentucky Woodland Magazine Special Pine Management Issue, Kentucky Environmental and Public Protection Cabinet, \$20,000—*Stringer, J.*

Silvicultural Prescriptions for Degraded Hardwood Stands, Forest Service, \$7,500—*Stringer, J.*

Status, Distribution, and Reproductive Characteristics of River Otters in Kentucky, Kentucky Department of Fish and Wildlife, \$48,703—*Lacki, M.*

Technical Support for Paul VanBooven Wildlife Management Area, Kentucky Department of Fish and Wildlife, \$24,435—*Stringer, J.*

Terrestrial Nuisance Species Management Plan, Kentucky Department of Fish and Wildlife, \$17,000—*Cox, J.*

The Common Raven in Cliff Habitat: Detection and Occupancy, Kentucky Department of Fish and Wildlife, \$30,000—*Cox, J.*

Horticulture

Total—\$ 539,133

Efficacy of Plant Growth Regulators (PGRs) on Branch Architecture of Container-Grown Shrubs, University of Florida, \$3,000—*Fulcher, A., Vaneva, B.*

eXtension Consumer Horticulture Community of Practice Leadership Funds 2008, University of Nebraska, \$14,800—*Durham, R.*

New Crop Opportunities, Phase IX, Cooperative State Research Education and Extension, \$521,333—*Ingram, D., Bale, S., Bastin, S., Bessin, R., Coolong, T., Crofcheck, C., Dillon, C., Grabau, L., Hildebrand, D., Hu, W., Jones, R., Kurtural, S., Lacefield, E., Lee, C., Montross, M., Pearce, W., Pfeiffer, T., Phillips, T., Potter, D., Smith, S., Snyder, J., Stombaugh, T., Strang, J., Van Sanford, D., Vincelli, P., Warner, R., Wilhoit, J., Williams, M., Woods, T.*

Kentucky Tobacco Research and Development Center

Total—\$ 130,580

Hypericum Extracts as Potential Anti-Relapse Medications in Alcoholism, Naprogenix, \$54,400—*Littleton, J.*

Transgenic Plant Cells as a Source of Hepatoprotective Drugs, Naprogenix, \$76,180—*Littleton, J.*

Landscape Architecture

Total—\$ 48,923

Rural Heritage Development Initiative Design Guidelines, City of Bardstown, \$48,923—*Crankshaw, N.*

Livestock Disease Diagnostic Center

Total—\$ 764,127

Animal Health and Grazing Systems, Cooperative State Research Education and Extension, \$37,872—*Carter, C., Aaron, D., Bush, L., Dougherty, C., Ely, D., Harrison, L., Taylor, N., Vanzant, E.*

Bovine Spongiform Encephalopathy (BSE) Surveillance Testing and Related Services, Kentucky Department of Agriculture, \$23,036—*Carter, C.*

Diagnostic Laboratory Services for Farmers and Agribusinesses, Kentucky Department of Agriculture, \$400,000—*Carter, C.*

Kentucky Statewide Food Animal Health Risk Surveillance and Disease Cluster Detection Initiative, Cooperative State Research Education and Extension, \$271,315—*Carter, C., Smith, J.*

Rhodococcus equi Pneumonia: Airborne Exposure and Foal Immunity/*Rhodococcus equi* Airborne Environmental Study, Texas A&M University, \$31,128—*Carter, C.*

West Nile Virus Testing and Related Services, Kentucky Department of Public Health, \$776—*Carter, C.*

Merchandising, Apparel, and Textiles

Total—\$ 34,293

Quality Control Laboratory for NAILM, National Association of Institutional Linen Management, \$34,293—*Easter, E.*

Nutrition and Food Science

Total—\$ 400,831

Bluegrass/Aspendale HOPE VI Revitalization, Lexington Fayette Urban County Government, \$57,384—*Forsythe, H., Ham, S.*

CYFERnet Program, Cooperative State Research Education and Extension, \$182,000—*Kurzynske, J., Stivers, W.*

Innovative Food Safety Education for Low-Literacy Food Service Employees Using Enhanced and Interactive Distance Learning, University of Connecticut, \$27,447—*Kurzynske, J.*

Promoting Life Skills in Middle School Youth, Cooperative State Research Education and Extension, \$134,000—*Kurzynske, J.*

Plant and Soil Sciences

Total—\$ 4,340,068

Accelerating the Development of FHB-Resistant Soft Red Winter Wheat Varieties, Department of Agriculture, \$62,784—*Van Sanford, D.*

Agronomic Limitations of Soybean Yield and Seed Quality in the U.S., Iowa State University, \$74,128—*Lee, C.*

Application Timing for Italian Ryegrass Control in Conventional and No-Till Wheat, Kentucky Small Grain Growers Association, \$3,000—*Martin, J., Call, D., Tutt, C.*

Bioavailability, Toxicity, and Trophic Transfer of Manufactured ZnO Nanoparticles: A View from the Bottom, Environmental Protection Agency, \$51,598—*Bertsch, P.*

Biomass Field Trials, Ceres Inc., \$150,889—*Smith, S.*

Center for the Environmental Implications of Nanotechnology (CEIN), Duke University, \$110,000—*Bertsch, P., Umrine, J.*

CPSF30 at the Convergence of RNA Processing, Cellular Signaling and Development in Plants, National Science Foundation, \$224,991—*Hunt, A.*

Decomposition in Drylands: Soil Erosion and UV Interactions, National Science Foundation, \$50,419—*McCulley, R.*

Development of a Sustainable Production Platform for Renewable Petroleum-Based Oils in Algae, National Science Foundation, \$249,925—*Chappell, J.*

Dicamba-Tolerant Soybeans—Weed Control, Monsanto Co., \$6,000—*Slack, C.*

Dynamics of Soil State Variables and Related Processes across a Land Use Gradient in Spatial and Temporal Transition, Cooperative State Research Education and Extension, \$324,000—*Wendroth, O., Coyne, M., Grove, J., Karathanasis, A., McCulley, R.*

Effects of Organic Amendments on Aggregation and Microbial Community Dynamics in Soils, University of Georgia, \$10,000—*D'Angelo, E., Lucas, S.*

Effects of Warming and Altered Precipitation Regime on Managed Grassland Structure and Function, Duke University, \$151,532—*McCulley, R.*

Environmental Remediation Science at Beamline X26A at the National Synchrotron Light Source, Department of Energy, \$50,000—*Bertsch, P.*

Evaluation of Hulless Barley: Minimizing the Late-Planted Yield Penalty in Double-Crop Soybeans, Kentucky Soybean Promotion Board, \$5,000—*Bruening, W.*

Improving Nitrogen Application Technology under Kentucky Conditions, Kentucky Small Grain Growers Association, \$5,000—*Murdock, L., Call, D., James, J., Schwab, G.*

Influence of Timing of Topdressing Nitrogen Fertilizer Relative to Application of Osprey Herbicide, Kentucky Small Grain Growers Association, \$2,800—*Martin, J., Call, D., Tutt, C.*

Integrated Weed Management Strategies to Increase Pasture Productivity, Cooperative State Research Education and Extension, \$116,188—*Green, J., Burdine, K., Schwab, G., Witt, W.*

Low Soybean Populations and Weed Control Year 2, Kentucky Soybean Promotion Board, \$11,000—*Herbek, J., Green, J., Lee, C., Martin, J.*

microRNA Array Technology and microRNA Biomarkers for Various Human Diseases, Kentucky Science and Technology Co. Inc., \$150,000—*Tang, G.*

Nicotiana Germplasm Survey, Philip Morris International Management SA, \$531,337—*Davies, H., Chambers, O., Mundell, R.*

Oilseeds as a Renewable Source of Epoxy Fatty Acids, Consortium for Plant Biotechnology Research Inc., \$90,000—*Hildebrand, D.*

Optimum GAT Corn University, Pioneer Hi-Bred International Inc., \$10,000—*Slack, C.*

Optimum Planting Date for Soybean, Kentucky Soybean Promotion Board, \$2,000—*Herbek, J.*

Pilot Study into Reduction of TSNA in Cured Burley Leaf, Advanced Technologies Cambridge Ltd., \$6,000—*Bailey, W.*

Production of Abietic Acid and Other Potentially Useful, Related Diterpenes in Tobacco Trichomes, Procter & Gamble Company, \$532,321—Wagner, G., Chappell, J., Tang, G., Yuan, L.

Regional Biomass Feedstock Partnership-Herbaceous Bioenergy Crop Field Trials, South Dakota State University, \$25,000—Pfeiffer, T.

Regional Biomass Feedstock Partnership, South Dakota State University, \$15,000—Williams, D.

Response to Soil Processes to an Aboveground Plant-Fungal Symbiosis from Rhizosphere to Regional Scales, Cooperative State Research Education and Extension, \$397,500—McNear, D., McCulley, R.

Soft Red Winter Wheat Breeding and Variety Development, Kentucky Small Grain Growers Association, \$39,750—Van Sanford, D.

Soil Mineral Nitrogen and Crop Biomass Dynamics of Winter Wheat in Space and Time in a Farmer's Field, Kentucky Small Grain Growers Association, \$4,500—Wendroth, O., Egli, D., Murdock, L., Schwab, G.

Soy MVP: Soybean Management Verification Program, Kentucky Soybean Promotion Board, \$84,367—Lee, C., Herbek, J., Murdock, L., Schwab, G.

Soybean Yield Response to Soil P and K Availability: Optimizing Fertilization Expenses, Kentucky Soybean Promotion Board, \$7,500—Grove, J., Murdock, L., Schwab, G.

Testing and Deployment of a Web-Based Yield Loss Prediction Tool for Risk Management of Soybean Rust, North Carolina State University, \$25,000—Omielan, J., Hershman, D., Van Doren, S.

The Evolution of Heterostylous Breeding Systems in Populations of *Oxalis alpina* in the Sky Islands of the United States and Mexico, University of Georgia, \$58,998—Tsyusko, O., Bertsch, P.

The Fate and Effects of Nanosized Metal Particles along a Simulated Terrestrial Food Chain Investigated Using Genomic and Microspectroscopic Techniques, Environmental Protection Agency, \$317,897—Unrine, J., Bertsch, P., Tsyusko, O.

Unraveling the Catalytic Specificity of Terpene Hydroxylases and Engineering Sesquiterpene Hydroxylation into Plants, National Science Foundation, \$168,532—Chappell, J.

U.S. Wheat and Barley Scab Initiative's Networking and Facilitation Office and Web Site, Agricultural Research Service, \$163,916—Van Sanford, D.

Validation Trial for Yield Loss Prediction Model for Asian Soybean Rust, Kentucky Soybean Promotion Board, \$24,000—Van Doren, S.

Wheat CAP Grant, Virginia Polytechnic Institute and State University, \$5,196—Van Sanford, D.

Wheat Management for Wet-Natured Soils, Kentucky Small Grain Growers Association, \$6,000—Schwab, G., Lee, C., Murdock, L.

Wheat Yield in 15-Inch Rows, Kentucky Small Grain Promotion Council, \$6,000—Lee, C., Herbek, J.

Wheat Yield Response to Old Corn Rows, Kentucky Small Grain Promotion Council, \$10,000—Lee, C., Schwab, G., Wendroth, O.

Plant Pathology

Total—\$ 3,146,165

A Host Protein Interaction and Localization Map for a Plant, National Science Foundation, \$200,000—Goodin, M.

Advanced Genetic Technologies, Cooperative State Research Education and Extension, \$448,178—Schardl, C., Howe, D.

Construction of a DNA-Based Virus-Induced Gene Silencing Tools for Functional Genomics of Soybeans, University of Illinois, \$36,380—Ghabrial, S.

Developing Glycerol as a Protective Agent against Soybean Diseases Prevalent in Kentucky, Kentucky Soybean Promotion Board, \$22,443—Kachroo, A.

Enhancing Soybean Yield by Manipulating the Expression of Seed Trait-Determining Genes, United Soybean Board, \$203,210—Kachroo, A., Ghabrial, S.

Epidemiology of Bean Pod Mottle Virus and Resistance to Major Pathogens of Soybean, Kentucky Soybean Promotion Board, \$15,000—Ghabrial, S., Hershman, D.

Expanding IPM PIPE for Cucurbit Downy Mildew Forecasting, North Carolina State University, \$6,000—Seebold, K.

Genetic, Molecular, and Biochemical Basis of Resistance to Turnip Crinkle Virus in Arabidopsis, Boyce Thompson Institute for Plant Research, \$83,669—Kachroo, P.

Glycerol Metabolism and Its Role in Biotrophy versus Necrotrophy in an Arabidopsis/Fungal Hemibiotroph Model System, National Science Foundation, \$156,047—Kachroo, P., Kachroo, A., Vaillancourt, L.

Identification of Anti-Prion Drugs Active against Plant Viruses, Kentucky Science and Technology Co. Inc., \$98,010—Nagy, P.

Impact of Newly Recognized HG-Type 2 Populations of Soybean Cyst Nematode (SCN) and Enhanced Grower Awareness of New SCN Challenges for Kentucky, Kentucky Soybean Promotion Board, \$9,100—Hershman, D.

IPM PIPE 2008: University of Kentucky Component, North Carolina State University, \$48,050—Hershman, D.

IR-4 Fungicide Performance Trials, University of Florida, \$5,000—Seebold, K.

Localization of Secreted Proteins during Penetration and Invasive Growth of the Rice Blast Fungus *Magnaporthe oryzae*, Cooperative State Research Education and Extension, \$990,000—Farman, M., Goodin, M.

Rhabdovirus Phosphoproteins: RNA Silencing and Complex Formation, National Institute of Allergy and Infectious Diseases, \$66,708—Goodin, M.

Roles of Host RNA Binding Proteins in Virus Replication, National Institute of Allergy and Infectious Diseases, \$200,124—Nagy, P.

Sentinel Plots to Monitor the Spread of Soybean Rust in U.S. Soybean Production Regions, North Central Soybean Research Program, \$19,625—Hershman, D.

Southern Region Plant Diagnostic Network, IPM PIPE 2007, Kentucky Component, University of Florida, \$39,000—Vincelli, P.

Soybean Health: Rust Gene Discovery Initiative, University of Illinois, \$34,000—Ghabrial, S.

The Role of a Host Ion Pump in RNA Virus Recombination, National Science Foundation, \$150,000—Nagy, P.

The Role of Signal Peptidase in the Pathogenic Association of the Anthracnose Stalk Rot Fungus *Colletotrichum graminiicola* with Maize, Cooperative State Research Education and Extension, \$140,010—Vaillancourt, L.

Telomere Hypervariability in the Fungus *Magnaporthe oryzae*—A Model Plant Pathogen, National Science Foundation, \$116,138—Farman, M.

Towards Developing Rust-Resistant Soybeans: Identifying Genes for Rust Resistance, University of Illinois, \$52,309—Ghabrial, S.

Uniform Trial on Integrated Management of FHB: Kentucky, Agricultural Research Service, \$7,164—Hershman, D., Lee, C.

Regulatory Services

Total—\$ 31,028

Medicated Feed Mill and BSE Rule Inspections, Food and Drug Administration, \$31,028—McMurry, S., Jaramillo, F.

Tracy Farmer Center for the Environment

Total—\$ 1,479,993

4-H Community-Based Science, Kentucky Department of Military Affairs, \$205,000—Hanley, C.

Community-Based Science for Teachers, Kentucky Council on Postsecondary Education, \$17,000—Hanley, C.

Environmental Education at UK: Addendum, Kentucky Department of Education, \$102,468—Hanley, C.

Information Technology through Community-Based Natural Resources Program for Students and Teachers, National Science Foundation, \$1,155,525—Hanley, C., Arthur, M.

Veterinary Science

Total—\$ 901,452

Analysis and Testing of Equine Immunologic Reagents, University of Massachusetts, \$31,250—Horohov, D.

Development and Characterization of Equine Arteritis Virus-Vectored Chimeric Viruses as Vaccines against Porcine Reproductive and Respiratory Syndrome Virus (PRRSV), Fort Dodge Laboratories, \$211,000—Balasuriya, U., Timoney, P.

Early Diagnosis of Fescue Toxicity, Kentucky Science and Technology Co. Inc., \$146,585—Tobin, T.

Effect of Equiloid Innovator or Metastim on Interferon-Gamma Production in the Foal, Fort Dodge Laboratories, \$52,000—Horohov, D.

Enhancing Interferon-Gamma in Foals, Grayson Jockey Club Research Foundation Inc., \$86,755—Horohov, D.

Equine Infectious Anemia Diagnostics, IDEXX Laboratories Inc., \$235,485—Issel, C.

Lateral Flow Molecular Assay for Detecting *Streptococcus equi*, Biohelix Corp., \$26,646—Artushin, S.

Molecular Epidemiology of EVA: 2006 Occurrence in the U.S., Grayson Jockey Club Research Foundation Inc., \$31,967—Balasuriya, U., Timoney, P.

Program in Equine Medical Genetics, University of Minnesota, \$27,000—Bailey, E., Lear, T., MacLeod, J.

Rapid Test for *S. equi* and *L. interrogans* in Clinical Specimens from Horses, Kentucky Science and Technology Co. Inc., \$42,393—*Artiushin, S., Timoney, J.*
Testing Methods for Influenza Infection in Equine Models, Science Applications International Co., \$10,371—*Chambers, T.*

Multidisciplinary Grants Led by Other Colleges*

Total—\$ 7,667,068

Demonstration of the Combustion Characteristics of Fuel Briquettes Made from Fine Coal and Biomass, Kentucky Office of Energy Policy, \$79,429—*Montross, M.*
Development of an Algae-Based System for CO₂ Mitigation from Coal-Fired Power Plants, Kentucky Office of Energy Policy, \$567,021—*Crofcheck, C., Montross, M.*
Establishment of a Laboratory for Biofuels at the University of Kentucky, Department of Energy, \$492,000—*Crofcheck, C.*
Establishment of a Laboratory for Biofuels Research at the University of Kentucky, Kentucky Office of Energy Policy, \$123,000—*Crofcheck, C.*

Geometry of Gene Cophylogenies as Relates to Genome Evolution and Speciation, National Institute of General Medical Sciences, \$280,000—*Schardl, C.*
Implications of Caveolae in Tat Signaling and Integrity of Brain Endothelium, National Institute of Mental Health, \$366,250—*Hennig, B.*
Reducing the Explosion Potential of Ammonium Nitrate Fertilizer, National Institute for Hometown Security, \$815,765—*Grove, J., Schwab, G.*
Rural Health Bioterrorism and Emergency Preparedness, University of Louisville, \$88,518—*Hancock, J., Henken, K., Henning, J., Husband, A., Hustedde, R., Miller, T., Newman, M., Priddy, K., Scharko, P., Vincelli, P., Welch, M.*
School Lunch Programs and the American Diet: Exploring a Contested Food Terrain, Rural Sociological Society, \$3,125—*Tanaka, K.*
Separation and Recovery of High-Value Pentose Derivatives from Cellulosic Biomass Using Molecular Imprinting, Department of Agriculture, \$999,964—*Nokes, S.*
Separation and Recovery of High-Value Pentose Derivatives from Cellulosic Biomass Using Mol+, Kentucky Office of Energy Policy, \$81,236—*Nokes, S.*

Southeast Center for Agricultural Health and Injury Prevention, National Institute of Occupational Safety and Health, \$1,036,294—*Purschwitz, M.*
Southeast Center for Agriculture Health and Injury Prevention, Center for Disease Control and Prevention, \$6,470—*Isaacs, S.*
Tat-Mediated Brain Endothelial Cell Dysfunction, National Institute of Neurological Disorders and Stroke, \$265,994—*Hennig, B.*
The Development of a Model of Molecular Events Leading to Seed Germination, Kentucky Science and Technology Co. Inc., \$19,002—*Downie, A., Perry, S.*
Transforming Kentucky's New Economy with EPSCoR, National Science Foundation, \$2,434,000—*Schardl, C., Webb, B.*
Transnational Policy Articulations: India, Agriculture, and the WTO, National Science Foundation, \$9,000—*Blackden, C.*

** Only College of Agriculture co-investigators are listed.*

Intellectual Property

Patents Issued

Horticulture

- Houtz, R.L., D. Rodgers, L. Dirk, and M. Williams. Crystallization and structure of a plant peptide deformylase. U.S. Patent 7,442,923. Issued November 4, 2008.
- Houtz, R.L., L. Dirk, and M. Williams. Inhibitors of plant peptide deformylase for use as broad-spectrum herbicides and methods for identifying the same. U.S. Patent 7,419,815. Issued September 2, 2008.

Plant and Soil Sciences

- Chappell, J., and B. Greenhagen. Sesquiterpene synthase gene and protein. U.S. Patent 7,442,785. Issued October 28, 2008.
- Chappell, J., and L. Ralston. Cytochrome P450s and uses thereof. U.S. Patent 7,405,057. Issued July 29, 2008.
- Hildebrand, D., and T. Hatanaka. Recombinant *Stokesia epoxygenase* gene. U.S. Patent 7,364,901. Issued April 29, 2008.

Genbank Register

Animal and Food Sciences

- Liao, S.F., J.A. Boling, and J.C. Matthews. *Bos taurus* PAT1 transporter EU563220
- Liao, S.F., J.A. Boling, and J.C. Matthews. *Bos taurus* SNAT1 mRNA, partial cds gi. Accession EU369763.
- Liao, S.F., J.A. Boling, and J.C. Matthews. *Bos taurus* SNAT4 mRNA, partial cds gi. Accession EU369764.
- Liao, S.F., J.A. Boling, and J.C. Matthews. *Bos taurus* SNAT3 mRNA, partial cds gi. Accession EU369765.
- Liao, S.F., J.A. Boling, and J.C. Matthews. *Bos taurus* ATA2 mRNA, partial cds gi. Accession EU563219.

James C. Matthews, S.F. Liao, and J.A. Boling had six additional accessions.

Plant and Soil Sciences

- Hatanaka, T., R. Li, K. Yu, and D.F. Hildebrand. *Vernonia galamensis* type 1 diacylglycerol acyltransferase (DGAT1a) mRNA complete cds. Accession EF653276.
- Li, R., T. Hatanaka, K. Yu, and D.F. Hildebrand. *Vernonia galamensis* type 1 diacylglycerol acyltransferase (DGAT1b) mRNA complete cds. Accession EF653277.
- Pattanaik S., Q. Kong, J.R. Werkman, D. Zaitlin, C.H. Xie, and L. Yuan. *Nicotiana tabacum* Anthocyanin2 (NtAn2) mRNA. Accession FJ472647.
- Pattanaik, S., C.H. Xie, and L. Yuan. *Nicotiana tomentosiformis* Anthocyanin2 (NtoAn2) mRNA. Accession FJ472648.
- Pattanaik, S., Q. Kong, J.R. Werkman, D. Zaitlin, C.H. Xie, and L. Yuan. *Nicotiana tabacum* Anthocyanin2 (NtAn2) gene. Accession FJ472650.
- Pattanaik, S., C.H. Xie, and L. Yuan. *Nicotiana tomentosiformis* Anthocyanin2 (NtoAn2) gene. Accession FJ472651.
- Werkman, J.R., S. Pattanaik, C. H. Xie, and L. Yuan. *Nicotiana tabacum* dihydroflavonol 4-reductase 2 (Dfr2) gene, promoter region. Accession FJ472649.
- Werkman, J. R., S. Pattanaik, C.H. Xie, and L. Yuan. *Nicotiana tabacum* chalcone synthase (chs) gene, promoter region. Accession FJ655994.
- Farman, M.L. *Neurospora crassa* OR74A Tel-IL, complete cds gi. Accession FJ589751.
- Farman, M.L. *Neurospora crassa* OR74A Tel-IR, complete cds gi. Accession FJ589752.
- Farman, M.L. *Neurospora crassa* OR74A Tel-III, complete cds gi. Accession FJ589753.
- Farman, M.L. *Neurospora crassa* OR74A Tel-III, complete cds gi. Accession FJ589754.
- Farman, M.L. *Neurospora crassa* OR74A Tel-III, complete cds gi. Accession FJ589755.
- Kachroo, A.P. *Glycine max* RAR1 protein mRNA, complete cds gi. Accession FJ222386.
- Kachroo, A.P. *Glycine max* SGT1-1 mRNA, complete cds gi. Accession FJ222387.
- Kachroo, A.P. *Glycine max* SGT1-2 mRNA, complete cds gi. Accession FJ222388.
- Kachroo, A.P. *Glycine max* heat shock protein 90-2 mRNA, complete cds gi. Accession FJ222389.
- Kachroo, A.P. *Glycine max* heat shock protein 90-1 mRNA, complete cds gi. Accession FJ222390.

Mark Farman had 19 additional accessions.

Veterinary Science

- Balasuriya, U.B.R., J. Zhang, and P.J. Timoney. Equine arteritis virus strain ARVAC, complete genome. Accession EU586275.
- Balasuriya, U.B.R., J. Zhang, and P.J. Timoney. Equine arteritis virus strain HeLa-EAVP10 envelope protein (E), glycoprotein 2 (GP2), glycoprotein 3 (GP3), glycoprotein 4 (GP4), glycoprotein 5 (GP5), unglycosylated membrane protein (M), and nucleocapsid protein (N) genes, complete cds. Accession EU826622
- Balasuriya, U.B.R., J. Zhang, and P.J. Timoney. Equine arteritis virus strain HeLa-EAVP35, complete genome. Accession EU252113.
- Balasuriya, U.B.R., J. Zhang, and P.J. Timoney. Equine arteritis virus strain HeLa-EAVP80, complete genome. Accession EU252114.
- Balasuriya, U.B.R., J. Zhang, and P.J. Timoney. Equine coronavirus, equine arteritis virus strain HeLa-EAVP60 envelope protein (E), glycoprotein 2 (GP2), glycoprotein 3 (GP3), glycoprotein 4 (GP4), glycoprotein 5 (GP5), unglycosylated membrane protein (M), and nucleocapsid protein (N) genes, complete cds. Accession EU826623
- Crowdus, C.A., and D.K. Howe. *Sarcocystis neurona* strain SN-OT1 putative surface antigen (SAG) gene, partial cds. Accession EU753119.
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- Tompkins, D., T. Hudgens, D. Horohov, B. Wagner, and C. Baldwin. *Equus caballus* macrophage inflammatory protein 1 alpha mRNA, complete cds. Accession EU438775.
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- Zhang, D., R. Herman, and D.K. Howe. *Sarcocystis neurona* apical protein 1 (APR1), complete cds. Accession FJ222456.

Udeni Balasuriya had two additional accessions. David Horohov had seven additional accessions.

Variety Releases

Plant and Soil Sciences

- Miller, R. KT D8LC dark fired-cured tobacco.
- Miller, R. KT 206LC hybrid burley tobacco.
- Pfeiffer, T. KN Morris hybrid sweet sorghum Joint release by the Kentucky Agricultural Experiment Station and the USDA at the University of Nebraska, Lincoln.
- Taylor, N. KY Select white clover.
- Van Sanford, D. Pembroke soft red winter wheat.

Publications

All publication dates in this section are 2008 unless otherwise noted.

Annual Report

One Hundred and Twentieth Annual Report of the Kentucky Agricultural Experiment Station for 2007. College of Agriculture, University of Kentucky, Nancy M. Cox, Director. June.

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- PR-583: 2008 Native Warm-Season Perennial Grasses Report. G.L. Olson, S.R. Smith, T.D. Phillips, and G.D. Lacefield, Plant and Soil Sciences.
- PR-582: 2008 Cool-Season Grass Horse Grazing Tolerance Report. G.L. Olson, S.R. Smith, G.D. Lacefield, and T.D. Phillips, Plant and Soil Sciences; L.M. Lawrence, Animal and Food Sciences.
- PR-581: 2008 Cool-Season Grass Grazing Tolerance Report. G.L. Olson, S.R. Smith, T.D. Phillips, and G.D. Lacefield, Plant and Soil Sciences; E. Vanzant, Animal and Food Sciences.
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- RB-305: *Analysis of Official Fertilizer Samples, July 2007-June 2008*. D.L. Terry.
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Alison Davis and Greg Halich contributed to one article in Biosystems and Agricultural Engineering.

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- Zhang, J., F. Miszczak, S. Pronost, C. Fortier, U.B.R. Balasuriya, S. Zientara, G. Fortier, and P.J. Timoney. Genetic variation and phylogenetic analysis of 22 French isolates of equine arteritis virus. pp. 77-78. *11th Nidovirus Symposium, University of Oxford, Oxford, United Kingdom, June 22-27.*
- Zhang, J., K.M. Shuck, G. Seoul, Y.Y. Go, Z. Lu, B.J. Meade, D.G. Powell, P.J. Timoney, and U.B.R. Balasuriya. Molecular characterization of equine arteritis virus isolates associated with the 2006/2007 multi-state disease occurrence in the USA. pp. 39-40. *2nd International Workshop on Equine Viral Arteritis, Lexington, Ky., Oct. 13-15.*
- Zhang, J., N.J. MacLachlan, P.J. Timoney, and U.B.R. Balasuriya. Persistent equine arteritis virus infection in HeLa cells. p. 70. *11th Nidovirus Symposium, University of Oxford, Oxford, United Kingdom, June 22-27.*
- Zhang, J., Y.Y. Go, N.J. MacLachlan, B.J. Meade, P.J. Timoney, and U.B.R. Balasuriya. Amino acid substitutions in both the structural and non-structural proteins of the modified live virus vaccine strain of equine arteritis virus are responsible for its attenuation. p. 60. *11th Nidovirus Symposium, University of Oxford, Oxford, United Kingdom, June 22-27.*

Graduate Degrees

Degrees listed are from the 2008 Spring Semester, 2008 Second Summer Session, and 2008 Fall Semester.

Ph.D. Dissertations

Agricultural Economics

- Jia, Haili.* The strategic exercise of options under noisy market conditions: Agribusiness firms' investments in providing precision agricultural services.
- Jiumpanyarach, Waripas.* Social trade-offs between health benefits and water supplies in rural Kentucky.
- Zhang, Qiang.* Three essays on risk and U.S. commodity exports.

Animal and Food Sciences

- Cox, Ryan.* Effects of soy lecithin on meat emulsion stability, moisture retention, sensory attributes, shelf life, and optical properties.
- Petty, Erica Ann.* Comparison of antibiotic susceptibility characteristics of fecal lactobacilli and the distribution of tetracycline resistance genes on two swine farms with different histories of antibiotic use.

Biosystems and Agricultural Engineering

- Stiglbauer, Paul Francis.* Fines reduction at orientated strandboard flakers.

Entomology

- Hladilek, Erin.* The role of spiders in the detrital food web of an eastern deciduous forest.

Forestry

- Alexander, H.A.* Upland oak and red maple: Community response and ecosystem effects in the presence and absence of fire disturbances.
- Angle, Patrick.* Forest establishment and water quality characteristics as influenced by spoil type on a loose-graded surface mine in eastern Kentucky.

Horticulture

- Horrall, Audrey.* Evaluation of soil biodiversity changes in an organic production system.

Plant and Soil Sciences

- Nunez, Andres.* Microbial community structure dynamics in Ohio River sediments during reductive dechlorination of PCBs.
- Saphangthong, Thatsaka.* Glyphosate tolerance of horseweed (*Coryza canadensis* (L.) Cronq.) accessions from Kentucky.
- Yang, Shengming.* Map-based cloning of an anthracnose resistance gene in *Medicago truncatula*.

Plant Pathology

- Venugopal, Srivathsa C.* Molecular, genetic, and biochemical characterization of oleic acid- and glycerol-mediated signaling in plant defense.
- Zhang, Dong-Xiu.* Loline alkaloid biosynthesis gene expression in *Epichloë* endophytes of grasses.

Veterinary Science

- Adams, A.A.* Immunosenesence and inflamm-aging in the horse.
- Mienaltowski, M.J.* Maturation and repair of articular cartilage.
- Sessions, D.* The impact of insulin on the matrix metalloproteinase system in equine follicular development and atresia.

M.S. Theses

Agricultural Economics

- Auchter, Katharine A.* An analysis of Kentucky trail riders: Determining rider behaviors and valuing site amenities that contribute to repeat visits.
- Kayrouz, Benjamin Michael.* Precision agriculture: Realizing increased profit and reduced risk through cost map and lightbar adoption.
- Vassalos, Michael.* Common agricultural policy, Greek agriculture, and multifunctionality.
- Yang, Shang-Ho.* What factors caused Kentucky hog supply to decline?
- Zhang, Lisha.* Assessing the demand for weather index insurance in Shandong Province, China.

Animal and Food Sciences

- Anderson, Georgina.* Effects of grazing high- and low-endophyte infected fescue on carcass and retail cut storage characteristics.
- Bohaty, Robin E.* The effects of added sulfur amino acids, threonine, and an ideal amino acid ratio on nitrogen metabolism in mature, overweight dogs.
- Hibbard, Gregory.* Dietary lysine:calorie ratios and their influence on nitrogen metabolism and digestibility in overweight, mature dogs.
- Ma, Yuanyuan.* Antioxidant and bile acid-binding peptides from *in vitro* digests of buckwheat protein.
- Quant, Anthony.* Standardized ileal digestible tryptophan to lysine ratios in growing pigs fed U.S.-type and non-U.S.-type feedstuffs.
- Sanders, Anne Kennedy.* Endocrine factors that affect fertility in lactating dairy cows.
- Watson, Katharine C.* Effects of chemical composition on preference of horses for cool season grasses.

Biosystems and Agricultural Engineering

- Abadie, Alicia Renee.* Quantifying cellulase in high-solids environments.
- Bodapati, Venkata Srikan.* Dynamic mechanical control system for soil reconstruction.

- Hayes, Morgan Davis.* Potential for pulse oximetry on a bovine ear tag.
- Li, Peng.* Water evaporation and energy fluxes in controlled environment saltwater shrimp production.
- Marsh, Jamie Rae.* Assessment of performance and placement of an injectable radio frequency identity and temperature sensor in horses.
- Sales, Glogerley Tatiana.* Assessment of compost particle sizes to optimize ammonia removal.
- Sama, Michael Patrick.* Low-cost system for remote sensing in agriculture.
- Taylor, Timothy John.* Hydrologic and water quality characteristics of loose-dumped mine spoil.
- Zandonadi, Rodrigo Sinaidi.* Development of a torque-based grain mass flow sensor for edible bean harvesters.

In addition, two non-thesis master's degrees were awarded in calendar 2008.

Community and Leadership Development

- Ellis, K.* Fostering social entrepreneurship through social venture creation: A strategy for rural communities.
- Geneve, M.L.* The science and art of a community development short course: An approach to design, teaching, and evaluation.
- Hancock, D.* Adolescent engagement in school and community extracurricular activities: Influences on developmental assets.
- Houck, A.* Content preparation of pre-service agricultural education teachers and its influence on their content knowledge.
- Jenkins, D.R.* Computer literacy, access, and use of technology in the family and consumer sciences classroom.
- White, C.C.* Supervised agricultural experience in Kentucky: Condition and perceptions.

In addition, nine non-thesis master's degrees were awarded in calendar 2008.

Family Studies

- Arnold, Amy Laura.* Socioeconomic status extremes: An investigation of parenting practices.
- Collins, Jana D.* Factors affecting medical appointment adherence of HIV positive patients.
- LaCourse, Jacob A.* Stages of marital change and relationship adjustment.
- Veldorale-Brogan, Amanda.* The missing link: Marital virtues in the communication-marital adjustment relationship.

In addition, six non-thesis master's degrees were awarded in calendar 2008.

Forestry

- Edwards, Jared.* Removal of manganese from alkaline mine drainage using a bioreactor with different organic carbon sources.
- Royse, Jacob.* Establishment and development of hardwood seedlings in response to prescribed fire in a central Appalachian forest.

Schumann, Andrea. University lands and biodiversity conservation in the United States.
Ullrey, Wade. Home range, habitat use, and food habits of the black bear in south-central Florida.
Wellman, Will. Using herbicides to control Japanese spirea (*Spirea japonica*) in the Big South Fork National River Recreation Area.

Merchandising, Apparel, and Textiles

Belcher, Jodie Lynn. An analysis of the care and maintenance of fleece products.
Chatelain, Amber Monique. An exploratory study of entertaining and its effect on the Generation Y consumer.
Fields, Rebecca. An investigation of Hispanic consumers' perceptions of environmental and personnel encounters in service settings.
Kessinger, Molly Beth. Quantitative measures representing the difference between proposed fashions in publications and dress worn by women photographed in media coverage in central Kentucky from 1940-1950 and 1964-1974.
Malone, Avery Anna. Historic dress as a teaching tool in the middle school social studies classroom.

In addition, one non-thesis master's degree was awarded in calendar 2008.

Nutrition and Food Science

Hofe, Carolyn. Challenges and opportunities to rural nutrition education programs in Kentucky's Superfund communities.
Holt, Rachel. Parental perceptions of nutrition status in children with neuro-developmental disorders.
Perry, Stephen. Nutritional intake of home school children and public school children: A comparison study.
Sakamoto, Akemi. Regional differences and associations with obesity-related factors in overweight and obese U.S. elderly people.

Plant and Soil Sciences

Carter, Jessica. Performance and physiology of yearling steers grazing toxic tall fescue as influenced by concentrate feeding and steroidal implants.
Daniels, Jared. Removal of manganese from an alkaline mine drainage using a bioreactor with different organic carbon sources.
Fan, Cui. Evolutionary and functional characterization of Os-POLLUX, a rice gene orthologous to a common symbiosis gene in legume.

Pike, Adam. Assessment of terrain attribute models for the identification of erosion-prone areas suitable for the establishment of grassed waterways in an agricultural field setting in the outer Bluegrass region of Kentucky.
Probst, Thomas. Harvest frequency and cultivar effects on yield, quality, and regrowth rate among new alfalfa cultivars.
Shumaker II, Paul. Inorganic and organic phosphorus interactions with hydroxy-interlayered soil materials.
Sobolewski, Robert. *Enterococcus faecium* survival and antibiotic resistance development in soils along a topographical gradient.
Wu, Tingting. Denitrifier ecology in a fragipan soil of Kentucky.

Veterinary Science

Black, K.S. Effects of the herbicides Plateau and Cimarron on pregnancy maintenance in broodmares.

Graduate Enrollment

Note: Data are from the UK Office of Institutional Research (<http://www.uky.edu/IR/student.html>).

	2007			2008			Net Change
	Master's	Doctorate	Total	Master's	Doctorate	Total	
Agricultural Economics	20	22	42	18	20	38	-4
Animal and Food Sciences	26	20	46	25	21	46	0
Biosystems and Agricultural Engineering	24	5	29	16	10	26	-3
Entomology	12	27	39	12	28	40	1
Family Studies	23	18	41	20	21	41	0
Forestry	19	*	19	17	*	17	-2
Merchandising, Apparel, and Textiles	16	*	16	7	*	7	**
Nutrition and Food Science	16	*	16	23	*	23	7
Plant Pathology	3	21	24	4	21	25	1
Plant and Soil Sciences/Horticulture	24	45	69	29	37	66	-3
Rural Sociology/Career, Technology and Leadership Education	41	15	56	35	18	53	-3
Veterinary Science	4	17	21	5	20	25	4
Grand Total			418			407	-11

* Degree type not offered.

** Total not combined with Interior Design, Merchandising, and Textiles program starting in 2008.

Financial Statement

Statement of Income and Expenditures Formula Funds and General Funds

Fiscal Year 2008

Income	
Federal Funds	
<i>Hatch</i>	\$ 5,895,845
<i>Hatch Multistate</i>	1,601,216
<i>McIntire-Stennis</i>	490,502
<i>Animal Health</i>	60,744
Total Federal Funds	\$ 8,048,307
Total State Funds	\$ 28,916,515
Total Funds	\$ 36,964,822

Expenditures	Federal	State	Total
Personal Services	\$ 5,170,698	\$22,757,598	\$ 27,928,296
Travel	148,848	208,135	356,984
Other Operating Expenses	1,309,614	5,507,668	6,817,282
Equipment	1,419,147	443,113	1,862,260
Total Expenditures	\$ 8,048,307	\$ 28,916,515	\$ 36,964,822

Staff

University of Kentucky Board of Trustees 2008

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Billy Joe Miles
Sandy Bugie Patterson
Phillip R. Patton
Erwin Roberts
Charles R. Sachatello
C. Frank Shoop
JoEtta Y. Wickliffe

Faculty Members:

Jeffrey B. Dembo and Ernest J. Yanarella

Staff Member:

Russ Williams

Student Member:

Tyler Montell

Agricultural Experiment Station

January 1, 2008—December 31, 2008

Administration

Lee T. Todd Jr., President
Kumble R. Subbaswamy, Provost
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Marc Mathews, Treasurer
Nancy M. Cox, Associate Dean for Research & Director
Linus R. Walton, Associate Dean for Administration
Lisa Collins, Assistant Director
J. D. Lawson, Assistant Director for Legal & Fiscal Affairs
W. O. Peterson, Director of Management Operations

Departments

Following are departmental personnel lists for calendar year 2008. (R) denotes Experiment Station appointment.

Agricultural Communications

Miller, T.H., Director (through May 25)
Skillman, L.M., Interim Director (beginning
May 26); Director (December)
Wood, C.H., CALE Lab Director and Professor

Agricultural Economics

Robbins, L.W., Professor and Chair (R)
Brown, R., Lecturer (R)
Davis, A., Assistant Extension Professor
Debertin, D.L., Professor (R)
Dillon, C., Associate Professor (R)
Freshwater, D., Professor (R)
Halich, G., Assistant Extension Professor
Hu, W., Assistant Professor (R)
Infanger, C.L., Extension Professor
Isaacs, S., Extension Professor
Jones, L.D., Extension Professor (R)
Katchova, A., Assistant Professor (R)
Maynard, L., Associate Professor (R)
Meyer, A.L., Extension Professor
Pagoulatos, A., Professor (R)
Pushkarskaya, H.N., Assistant Professor (R)
Reed, M.R., Professor (R)
Riggins, S.K., Extension Professor
Saghaian, S., Assistant Professor (R)
Skees, J.R., Professor (R)
Snell, W.M., Extension Professor
Trimble, R.L., Extension Professor
Walters, C., Assistant Extension Professor
Williamson, L., Extension Professor
Woods, T., Associate Extension Professor

Animal and Food Sciences

Harmon, R.J., Professor and Chair
Aaron, D.K., Professor (R)
Amaral-Phillips, D.M., Extension Professor
Anderson, L.H., Associate Extension Professor
Bewley, J.M., Assistant Extension Professor
Boatright, W.L., Professor (R)
Boling, J.A., Professor (R)
Bullock, K.D., Extension Professor
Burris, R., Extension Professor
Cantor, A.H., Associate Professor (R)
Camargo-Stutzman, F.C., Assistant Extension
Professor
Coffey, R.D., Associate Extension Professor
Coleman, R.J., Associate Extension Professor
Cox, N.M., Associate Dean for Research
Cromwell, G.L., Professor (R)
Dawson, K.A., Adjunct Professor
Edgerton, L.A., Associate Professor (R)
Ely, D.G., Professor (R)
Flythe, M.D., Adjunct Assistant Professor
Harmon, D.L., Professor (R)
Heersche Jr., G., Extension Professor
Hennig, B., Professor (R)
Hicks, C.L., Professor (R)
Jackson Jr., J.A., Associate Professor (R)
Lawrence, L.M., Professor (R)

Lehmkuhler, J.W., Assistant Extension Professor
Lindemann, M.D., Professor (R)
Matthews, J.C., Associate Professor (R)
McAllister, A.J., Extension Professor
McLeod, K.R., Associate Professor (R)
Newman, M.C., Associate Professor (R)
O'Leary, J., Associate Extension Professor
Pescatore, A.J., Extension Professor
Pierce, J.L., Adjunct Assistant Professor
Rentfrow, G.K., Assistant Extension Professor
Rossano, M.G., Assistant Professor (R)
Schillo, K.K., Associate Professor (R)
Silvia, W.J., Professor (R)
Strickland, J.R., Adjunct Associate Professor
Strobel, H.J., Associate Professor (R)
Suman, S.P., Assistant Professor (R)
Thrift, E.A., Professor (R)
Tidwell, J., Adjunct Assistant Professor
Urschel, K.L., Assistant Professor (R)
Vanzant, E.S., Associate Professor (R)
Wang, C., Adjunct Assistant Professor
Webster, C., Adjunct Assistant Professor
Xiong, Y., Professor (R)

Biosystems and Agricultural Engineering

Shearer, S.A., Professor and Chair
Agouridis, C.T., Assistant Research Professor
(R)
Castillo, M., Assistant Research Professor (R)
Colliver, D.G., Professor (R)
Crofcheck, C., Associate Professor (R)
Edwards, D.R., Professor (R)
Fehr, R., Extension Professor (R)
Gates, R.S., Professor (R) (through Sept. 2008)
McNeill, S.G., Associate Extension Professor
Montross, M.D., Associate Professor (R)
Nokes, S.E., Professor (R)
Overhults, D.G., Associate Extension Professor
(R)
Payne, F.A., Professor (R)
Purschwitz, M.A., Extension Professor (R)
Stombaugh, T.D., Associate Extension
Professor (R)
Taraba, J., Extension Professor (R)
Warner, R.C., Extension Professor (R)
Wells, L.G., Professor (R)
Wilhoit, J., Associate Extension Professor (R)
Workman, S., Associate Professor (R)

Community and Leadership Development

Hansen, G., Extension Professor and Chair (R)
Dyk, P., Associate Professor (R)
Garkovich, L., Professor (R)
Hains, B., Assistant Professor (R)
Harris, R., Associate Professor (R)
Horstmeier, R.P., Associate Professor (R)
Hustedde, R., Extension Professor
Jones, K., Assistant Extension Professor (R)
Kitchel, T., Assistant Professor (R)

Maurer, R., Extension Professor
Nah, S., Assistant Professor (R)
Ricketts, K., Assistant Extension Professor
Tanaka, K., Associate Professor (R)
Warner, P., Extension Professor
Weckman, R., Associate Professor
Witham, D., Professor
Zimmerman, J., Associate Extension Professor
(R)

Entomology

Obrycki, J.J., Professor and Chair
Barney, R.J., Assistant Adjunct Professor
Bessin, R.T., Extension Professor
Brown, G.C., Professor (R)
Dobson, S.L., Associate Professor (R)
Fox, C.W., Professor (R)
Harwood, J.D., Assistant Professor (R)
Haynes, K.E., Professor (R)
Johnson, D.W., Extension Professor
Palli, S.R., Professor (R)
Potter, D.A., Professor (R)
Potter, M.E., Extension Professor
Rieske-Kimney, L.K., Professor (R)
Sedlacek, J.D., Assistant Adjunct Professor
Sharkey, M.J., Professor (R)
Townsend, L.H., Extension Professor
Webb, B.A., Professor (R)
Webster, T.C., Assistant Adjunct Professor
White, J.A., Assistant Professor (R)
Yeagan, K.V., Professor (R)
Xuguo, Z., Assistant Professor (R)

Equine Initiative

Coleman, R., Associate Director for
Undergraduate Education in Equine
Science and Management
MacLeod, J., Director and Dickson Professor
of Equine Science and Management
Wiemers, H.E., Communications Director

Family Studies

Werner-Wilson, R.J., Endowed Professor and
Chair (R)
Ellington, V., Lecturer
Flashman, R.H., Assistant Professor (R)
Haleman, D., Lecturer
Hans, J.D., Assistant Professor (R)
Heath, C.J., Professor (R)
Hosier, A., Assistant Extension Professor (R)
Kim, H., Associate Professor (R)
Mimbs, C.A., Assistant Professor (R)
Mowery, R.L., Assistant Professor (R)
Simmons, L.A., Assistant Professor (R)
Smith, D.R., Associate Professor
Vail, A., Professor, Director of the School
of Human Environmental Sciences and
Assistant Director of Family and Consumer
Sciences Extension (R)
Wood, N., Instructor (R)

Forestry

Bullard, S., Professor and Chair
Arthur, M.A., Professor (R)
Barnes, T.G., Extension Professor
Barton, C., Assistant Professor (R)
Connors, T.E., Associate Extension Professor
Cox, J.J., Adjunct Professor (R)
Fei, S., Assistant Professor (R)
Hill, D.H., Extension Professor
Kalish, P.J., Associate Professor
Lacki, M.J., Professor (R)
Lhotka, J.M., Assistant Professor (R)
Maehr, D.S., Professor (R)
Ringe, J.M., Professor
Stringer, J.W., Associate Extension Professor (R)
Wagner, D.B., Associate Professor

Horticulture

Ingram, D.L., Professor and Chair
Antonious, G., Adjunct Assistant Professor
Archbold, D.D., Professor (R)
Bomford, M., Adjunct Assistant Professor
Buxton, J.W., Associate Professor (R)
Cappello, P., Adjunct Assistant Professor
Coolong, T.W., Assistant Extension Professor (R)
DeBolt, S., Assistant Professor (R)
Downie, A.B., Associate Professor (R)
Dunwell, W.C., Extension Professor
Durham, R.E., Associate Extension Professor
Fountain, W.M., Extension Professor
Geneve, R.L., Professor (R)
Houtz, R.L., Professor (R)
Jones, R.T., Extension Professor
Kurtural, K., Adjunct Assistant Professor
Masabni, J.G., Associate Extension Professor (R)
Pomper, K., Adjunct Assistant Professor
Schnelle, R.A., Assistant Extension Professor
Snyder, J.C., Associate Professor (R)
Strang, J.G., Extension Professor
Williams, M.A., Associate Professor (R)

Kentucky Tobacco Research and Development Center

Davies, H. M., Director
Chambers, O.D., Biotechnology Relations Director
Li, B., Scientist III
Maiti, I.B., Scientist III
Zaitlin, D., Scientist III

Landscape Architecture

Schach, H., Professor and Chair
Crankshaw, N.M., Associate Professor
Fields, L., Assistant Professor
Hargrove, R.A., Assistant Professor
Lee, B.D., Assistant Professor
Nieman, T.J., Professor (R)

Livestock Disease Diagnostic Center

Carter, C.N., Professor and Director (R)
Bolin, D.C., Associate Professor
Bryant, U.K., Assistant Professor
Cassone, L.M.C., Assistant Professor
Donahue, J.M., Professor
Gaskill, C.L., Associate Professor
Hong, C.B., Professor
Jackson, C.B., Associate Professor
Loynachan, A.T., Assistant Professor
Kennedy, L.A., Assistant Professor
Scharko, P.B., Associate Professor
Vickers, M.L., Associate Professor
Williams, N.M., Professor and Associate Director

Merchandising, Apparel, and Textiles

Vail, A., Interim Chair
Easter, E.P., Professor
Jackson, V.P., Associate Professor
Joshi, P.R., Lecturer
Lee, M.-Y., Assistant Professor
Michelman, S.O., Associate Professor
Spillman, K.M., Associate Professor
Wesley, S.C., Assistant Professor

Nutrition and Food Science

Kurzynske, J.S., Associate Professor and Chair
Adams, I.R., Assistant Professor
Addo, K., Associate Professor
Bastin, S.B., Associate Professor
Brown, D.O., Associate Professor
Chow, C.K., Professor (R)
Cook-Newell, M., Lecturer
Forsythe, H.W., Associate Professor (R)
Gaetke, L., Associate Professor
Glauert, H., Professor (R)
Ham, S., Associate Professor
Perry, S.D., Instructor
Roseman, M.G., Associate Professor
Stephenson, T.J., Lecturer
Tietyen, J., Associate Professor
Webber, K., Assistant Professor

Plant and Soil Sciences

Barrett, M., Professor and Chair
Aiken, G.E., Associate Adjunct Professor
Bailey, W.A., Associate Extension Professor
**Baskin, C.*, Professor (R)
Bertsch, P., Professor (R)
Chappell, J., Professor (R)
Cornelius, P.L., Professor (R)
Coyne, M., Professor (R)
D'Angelo, E.M., Associate Professor (R)
Davies, M., Professor and Director, KTRDC
Dinkins, R., Assistant Adjunct Professor
Ditsch, D., Associate Extension Professor
Dougherty, C.T., Professor (R)
Egli, D.B., Professor (R)
Grabau, L.J., Professor (R)
Green, J.D., Extension Professor

Grove, J.H., Associate Professor (R)
Herbek, J.H., Extension Professor
Hildebrand, D.F., Professor (R)
Hunt, A.G., Professor (R)
Kagan, I., Assistant Adjunct Professor
Karathanasis, A.D., Professor (R)
Kumudini, S., Assistant Professor (R)
Lee, C.D., Associate Extension Professor (R)
Martin, J.R., Extension Professor
Matocha, C.J., Associate Professor (R)
McCulley, R.L., Assistant Professor (R)
McNear, D.H., Assistant Professor (R)
Miller, R.D., Professor (R)
Mueller, T.G., Associate Professor (R)
Murdock, L.W., Extension Professor
Pearce, R.C., Associate Extension Professor
Perry, S.E., Associate Professor (R)
Pfeiffer, T.W., Professor (R)
Phillips, T.D., Associate Professor (R)
Schwab, G.J., Associate Extension Professor
Sikora, F., Associate Adjunct Professor
Smalle, J., Assistant Professor (R)
Smith, S.R., Associate Extension Professor
Tang, G., Assistant Professor (R)
Uhrine, J., Assistant Research Professor (R)
Van Sanford, D.A., Professor (R)
Wagner, G.J., Professor (R)
Wendroth, O., Associate Professor (R)
Williams, D.W., Associate Professor (R)
Witt, W.W., Professor (R)
Xu, D., Assistant Adjunct Professor
Yuan, L., Assistant Professor (R)
Zhu, H., Assistant Professor (R)

* Joint Biological Sciences

Plant Pathology

Smith, D.A., Professor and Chair
Bachi, P.R., Research Specialist
Beale, J.W., Research Specialist
de Sá, P., Research Specialist
Farman, M.L., Associate Professor (R)
Ghabrial, S.A., Professor (R)
Goodin, M.M., Associate Professor (R)
Hartman, J.R., Extension Professor
Hershman, D.E., Extension Professor
Kachroo, A.P., Assistant Professor (R)
Kachroo, P., Associate Professor (R)
Kennedy, B.S., Research Specialist
Nagy, P.D., Professor (R)
Nuckles, E.M., Research Specialist
Pogany, J., Research Specialist
Schardl, C.L., Professor (R)
Seebold Jr., K.W., Assistant Extension Professor
Thornbury, D.W., Scientist II
Vaillancourt, L.J., Associate Professor (R)
Vincelli, P., Extension Professor
Wang, R., Research Specialist

Regulatory Services

Thom, W.O., Director and Professor
Barrow, M.C., Inspector
Bryant, M., Feed/Fertilizer Laboratory
Coordinator
Buckingham, D.T., Seed Regulatory Coordinator
Coffey, D.S., Inspector
Finneseth, C.L.H., Seed Testing Coordinator
Flood, J.S., Inspector
Hickerson, R.R., Inspector
Jaramillo Jr, F., Feed Coordinator
Johnston, C.B., Inspector
Johnston, N.T., Inspector
Mason, D.W., Inspector
McMurry, S.W., Inspection Coordinator
Pinkston, W.W., Inspector
Prather, T.G., Inspector
Sikora, F.J., Soil Testing Coordinator and
Professor
Spencer, H.S., Auditor
Terry, D.L., Fertilizer Coordinator and Assistant
Director
Thompson, C.D., Milk Coordinator
Webb, S.F., Analytical Laboratory Coordinator
Whitehouse, W.J., Inspector

Robinson Station

Ditsch, D., Superintendent

Sustainable Agriculture & Food Systems Working Group

Perry, R.R., Coordinator

Tracy Farmer Center for the Environment

Hanley, C., Director of Education and
Communications

Veterinary Science

Troedsson, M.H.T., Professor and Chair (R)
Allen, G.P., Professor
Artiushin, S.C., Assistant Professor (R)
Bailey, E.F., Professor (R)
Balasuriya, U.B., Associate Professor (R)
Chambers, T.M., Associate Professor (R)
Cook, R.F., Assistant Professor (R)
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Fitzgerald, B.P., Associate Professor (R)
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