

*The Kentucky
Agricultural Experiment Station*

120th

Annual Report
2007

UK
UNIVERSITY
OF KENTUCKY
College of Agriculture

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

I herewith submit the one hundred and twentieth annual report of the Kentucky Agricultural Experiment Station for the period ending December 31, 2007. 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, 2008

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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
Food Systems Initiative
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
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 2007. 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 2007.

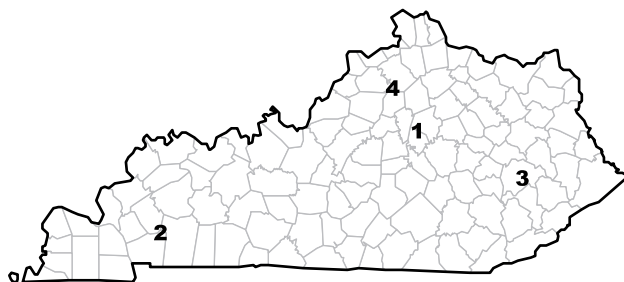
Efforts are constantly made to ensure that the research studies have application to the problems of all Kentucky farmers and other clientele groups. Locations of the experimental facilities provide conditions representative of most sections of the state.

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.

Unit Reports

Equine Initiative

The mission of the Equine Initiative is to discover, share, and apply new knowledge to enhance the health, performance, and management of horses commensurate with the signature status of Kentucky's equine industry.

Starting in the spring of 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 Commonwealth'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.

As part of the Equine Initiative, UK has created a new equine-based undergraduate curriculum, enhanced existing equine research programs and created new ones, expanded current outreach programs and created new ones, and established new partnerships with other equine organizations and universities. Stakeholder input has been fundamental to the formation of the Equine Initiative.

Research

Animal and Food Sciences

For the past 25 years, researchers in the Department of Animal and Food Sciences have concentrated their efforts in the area of equine nutrition and feeding management. Current research areas include:

- Nutrient requirements of broodmares and growing horses;
- Dietary ingredients or management procedures that improve food utilization and enhance the health of the equine gastrointestinal tract;
- The roles that nutrition and feeding management play in optimal mare and foal management;
- Selecting nutritious, palatable, and hardy plants for central Kentucky horse pastures; understanding the effects of endophyte-infected tall fescue on broodmares and growing horses; and
- The effect of diet composition on the metabolism and hormonal systems of broodmares and growing and aging horses.

Community and Leadership Development

Expanding on the work by Harvard University's Michael Porter in 1998, faculty within the college's Community and Leadership Development Department are applying the concept of economic clusters to Kentucky's horse industry. While other states have more horses, according to the 2002 Census of Agriculture, the value of horses sold in Kentucky is more than five times their value in Texas, the second-ranked state. In no other state are horses the largest component of the market value of agricultural sales. According to the Kentucky Agricultural Statistics Service, in 2005 Kentucky horses produced \$1 billion in

cash receipts, representing 25 percent of total agricultural cash receipts. A Kentucky Horse Council study (2004) estimated that in 2002 the direct economic impact of the Kentucky equine industry was \$1.13 billion, and the total impact was \$1.77 billion, including 31,800 jobs and a payroll of \$630 million.

Veterinary Science

Since the inception of the Veterinary Science Department in 1919, researchers in the department have been on the forefront of equine health research and are now more widely known through the Maxwell H. Gluck Equine Research Center. The mission of the center is the scientific discovery, education, and dissemination of knowledge for the benefit of the health and welfare of horses.

Plant and Soil Sciences

The Pasture Evaluation Program began as a pilot program in 2005 and expanded into a full-fledged service in 2006 and 2007. The program provides area horse farms with an assessment of the types and ratios of grasses and weeds present in pastures, an estimation of forage available and percent of tall fescue, and whether a common and potentially harmful fungus found in tall fescue is present. This fungus found in tall fescue can cause pregnant mares to experience foal loss, so its presence is of particular interest to horse farm owners and operators. This program is based on extensive research capacity in forage and weed management.

Instruction

Prior to 2007, UK had only horse-related courses, not a degree program—a strongly identified need in a state that derives a big part of its identity from horses.

Beginning in fall 2007, UK's College of Agriculture began offering equine courses in its new Equine Science and Management undergraduate degree program. The program is comprised of two tracks—an equine management option focusing on the day-to-day operations of the horse and farm enterprise and an equine industry option that focuses on marketing and economic issues. Interest in UK's new undergraduate major is widespread, with inquiries coming from across the United States as well as from other countries.

Facilities

The future of equine programs at UK is inherently tied to the facilities available for superior teaching, research, and extension offerings. A push is under way to build the facilities to match this vision. The equine campus will provide up-to-date and highly functional facilities for university research and education. The green space, attractive buildings, and landscape design will conserve and enhance an aesthetic and environmental resource for Fayette County. Additionally, facilities will demonstrate how to employ best management practices for operating a horse facility while protecting the environment.

Food Systems Initiative

The mission of the Food Systems Initiative is to promote the development of new food enterprises, markets, and products by connecting university expertise with Kentucky entrepreneurs. The initiative serves as a network hub for the College of Agriculture with local, regional, national, and international government and nongovernmental organizations concerned with food systems from the farm to the plate. It provides food systems research support across the university and has a Faculty Coordinating Committee from all College of Agriculture departments with defined food programs.

One of the most innovative characteristics of the Food Systems Initiative is the connection with working chefs. Chefs initiate changes in food consumption patterns by offering innovative dishes that filter down to the consumer as new products or markets. The Food Systems Initiative maintains this connection to chefs and serves as an interpreter between chefs and researchers who work in similar areas but do not always understand each other. Kentucky chefs seeking locally grown products also rely on the Food Systems Initiative to help them make connections with farmers and processors.

Research Support

Animal and Food Science

The Food Systems Initiative serves as a point of contact for meat and dairy producers seeking research support. Kentucky entrepreneurs Vito's Sausage, Green River Cattle Company, JD's Country Milk, Southern Delight Gourmet Foods, and many other independent Kentucky food producers have been assisted by Dr. Gregg Rentfrow, Dr. Melissa Newman, and others, significantly shortening the response time to their inquiries.

Nutrition and Food Science

Home-based processing and microprocessing of food products have grown considerably since the passage of House Bill 391, which allows Kentucky farmers who grow and harvest produce to process value-added products and sell them from designated farmers' markets, certified roadside stands, and the processor's farm. Many producers seek guidance through the Food Systems Initiative. In many cases, simple questions can be answered quickly, and the more complicated or regulatory issues are facilitated through Dr. Sandra Bastin. Many inquiries have also been received from the Community/Certified Kitchens across the state, including the development and planning for new kitchens in Bath and Jackson counties.

Horticulture

The Food Systems Initiative was able to arrange a taste panel with some of Kentucky's best chefs to taste more than 30 varieties of melons grown by Dr. John Strang at the Horticulture Research Farm. The Food System Initiative also distributed samples of Dr. John Snyder's Ubatuba peppers to area chefs for trials, generating professional feedback on the taste, quality, and potential utilization of this new variety.

Agricultural Economics

Researchers and specialists in Agricultural Economics have sought information pertaining to markets, both commercial and consumer, through the Food Systems Initiative's network of chefs and advocacy groups, especially the work of Dr. Tim Woods and Dr. Lee Meyer.

Conference Planning

The Food Systems Initiative staff have assisted with conference planning, logistics, and especially "Kentucky Proud" meals for the Experiment Station Research Office, Horticulture, Entomology, Rural Sociology, Animal and Food Sciences, Nutrition and Food Science, Geography, UK Food Service, UK Residence Life Office, and the UK Extension Service.

Market Maker

The Food Systems Initiative has been an integral part of the team developing Kentucky Market Maker, an online searchable directory of all food products available in Kentucky. Numerous training sessions were held around the state and at conferences to teach producers how to register and use the site and Cooperative Extension agents how to help their constituents utilize the program.

Growing Kentucky II: Land, Food, and Culture: Creating Sustainability Where You Live

The Food Systems Initiative took the lead in organizing this conference attended by more than 500 researchers, specialists, local food advocates, and citizens that included nationally known keynote speaker nutritionist Marion Nestle.

Outreach

Local Food Network Hub

The Food Systems Initiative serves 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; Allied Food Marketers; advocacy groups such as Chefs Collaborative, Slow Food USA, Partners for Family Farms, Community Farm Alliance, Sierra Club, the American Grassfed Association, Community Food Security Coalition, and, most importantly, the farmer/producers themselves. By facilitating communication among these various organizations, 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.

UK Food Services

The Food Systems Initiative serves as a resource for bringing locally produced food into the university's dining halls and catering division. As a result of this effort, one of the most popular requests for on-campus catering is for "Kentucky Proud" meals.

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 Center's research projects explore the development and use of tobacco as a production system for plant-made pharmaceuticals and the discovery of new plant natural products having potential for commercialization. The KTRDC program emphasizes applications-oriented research designed to facilitate the development of new crop-based businesses and technologies for Kentucky agriculture.

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/PMP Research

Plant biotechnology is a revolutionary field that harnesses to practical advantage the knowledge gained over more than half a century of basic plant research. Agriculture is already realizing huge benefits from improved crops developed through biotechnology, which show remarkable resistance to insect damage, markedly reduced dependence on herbicides, etc.

A particularly exciting branch of this fast-moving field is the engineering of plants to produce new biological substances, enabling agricultural crops to be used as "production systems" to supply valuable materials such 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 opportunities.

Although the basic technology required to "engineer" tobacco and other plants to produce new substances has been available for more than 10 years, agricultural biotechnology initially concentrated on improvements to the performance and management of such crops as cotton, soybeans, corn, etc. However, the exciting prospect of new uses for tobacco and other plants is now attracting more attention, driven especially by the critical demand for protein pharmaceuticals. Recent progress in medical biotechnology has resulted in the ongoing development of literally hundreds of new protein-based medical drugs, the production of which will greatly exceed the capacity of current protein-manufacturing capacity. Plants such as tobacco have the potential to impact this manufacturing crisis, and the resulting new agricultural biotechnology sector is referred to as "plant-made pharmaceuticals," or PMP.

The primary goal of KTRDC research is to facilitate and encourage the use of tobacco in Kentucky as a production system for PMP applications.

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, 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 new 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 PMP applications;
- Devising new "support" technologies for PMP 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 a crop-based production system: 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 Mr. 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 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 ("identity preservation"). This research is conducted in close collaboration with the Plant and Soil Sciences Department in the UK College of Agriculture.

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 constructed two larger greenhouses at the university's Spindletop Research Farm in Lexington.

KTRDC has its own 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 for computer networking.

Research Services

The KTRDC Plant Genetic Engineering Service develops prototype transgenic tobacco (or Arabidopsis) plants for university researchers or company collaborators. This service, which makes use of proprietary promoters and other technologies developed at KTRDC, is very helpful to investigators who have isolated genes of relevance to agricultural biotechnology but who lack the resources needed to explore their utility in plants. To inquire about this service, please contact principal investigator Dr. Indu Maiti by e-mail (imaiti@uky.edu) or telephone 859-257-3296.

KTRDC also has considerable experience in conducting field trials with transgenic plants under permit and with the accompanying permit-application process. Researchers interested in conducting work that involves field release of transgenic plants are welcome to contact Dr. Orlando Chambers for assistance (ochamb@uky.edu or 859-257-7044).

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 UK Livestock Disease Diagnostic Center'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.

The mission of the LDDC is fulfilled by achieving the following objectives:

- Assist practicing veterinarians in arriving at a timely and definitive diagnosis of animal disease problems.
- Improve farm productivity and income by helping to assure the health of agricultural animals by providing timely and accurate diagnostic testing and epidemiological services.
- Help to assure the health, wellness, and growth of Kentucky's signature equine industries through the application of cutting-edge disease diagnostic technology and epidemiological services.
- Help to assure the health and wellness of Kentucky's companion animals by providing timely diagnostic testing services, thereby preserving the human-animal bond and the well-being of families.
- Provide meaningful, timely, and accurate dissemination of animal health information by electronic means whenever possible to improve animal health situational awareness for veterinarians and farmers.
- Contribute to preservation of public health through the early and accurate diagnosis of zoonotic diseases.
- Partner with the USDA, the Kentucky Office of the State Veterinarian, the Breathitt Veterinary Center, and the Kentucky Cabinet for Health and Family Services to serve as a team for economic development, emergency preparedness, and public health.
- Partner with the Gluck Equine Research Center to advance the art and science of veterinary diagnostic medicine for the betterment of Kentucky equine industries and beyond.
- Partner with University of Kentucky College of Agriculture and other university departments to advance the art and science of veterinary diagnostic medicine and public health.
- Partner with other universities and institutions to advance the art and science of veterinary diagnostic medicine and public health.

- Promote a creative, learning, challenging, and enjoyable work environment that will facilitate the preparation, recruitment, and retention of the next generations of veterinary diagnosticians and the highest quality faculty, technical, and administrative staff.
- Promote a work environment that welcomes all people and honors diversity in an inclusive atmosphere that values curiosity, the pursuit of knowledge, and personal freedom and integrity.

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), and avian influenza. Furthermore, the laboratory is always on the watch for the emergence of foreign animal diseases such as foot and mouth disease, classical swine fever, and others.

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.

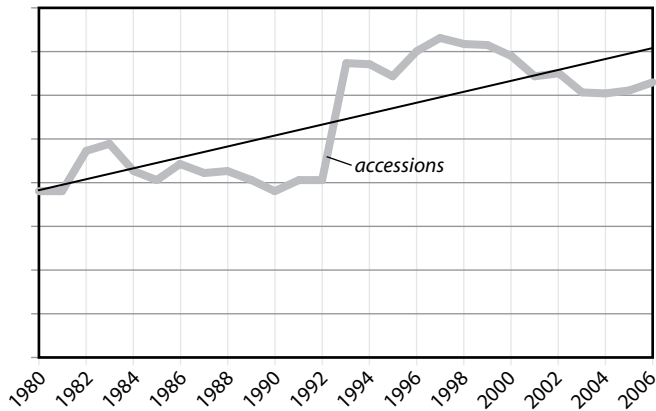
The LDDC faculty, scientists, and technical staff are specialists in essential scientific disciplines directly related to animal health to include bacteriology, clinical pathology, epidemiology, extension, molecular biology, pathology, serology, toxicology, and virology. Disease diagnostic efforts are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

2007 Highlights:

The LDDC's accession load is steadily increasing. The total number of cases received for calendar year 2007 was 61,905, reflecting an increase of 282 cases. The overall trend has been on the increase since 2003.

In 2004, the American Association of Veterinary Laboratory Diagnosticians (AAVLD) placed the LDDC on provisional accreditation because of major facility deficiencies. Following notification of the actions taken by the AAVLD, a capital improvement request was taken to the Kentucky General Assembly during the 2005 session, and the legislature approved \$8.5 million for phase 1 to upgrade the LDDC. This appropriation does not provide the funds to upgrade the other services essential for full accreditation. Therefore, an additional \$20 million has been requested.

LDDC Accession Load



In preparation for the funding, the LDDC engineering and architectural team has been working closely with LDDC faculty and staff to develop plans for the renovation and expansion of the laboratory to include an alkaline digester and a waste effluent pre-treatment plant. The new design includes the construction of a free-standing necropsy “factory” which will also house two alkaline digesters, a new administration area, laboratory space for serology and molecular biology, and a total renovation of the existing laboratory space.

In August 2007, Dr. Lenn Harrison retired and was succeeded by Dr. Craig N. Carter, previously section chief of epidemiology at the LDDC. Soon after, Dr. Neil Williams was appointed as the LDDC Associate Director and as section chief for pathology. In addition, a search was conducted for a diagnostic services coordinator. Dr. Deb Williams, part-time technician in clinical pathology was selected for this position. She will become the section chief for a new diagnostic services section that will encompass the existing clinical receiving and medical records sections. The primary mission of this new section is to improve the accuracy and timeliness of accessioning, laboratory test ordering, resulting, and reporting.

Dr. Carter’s highest priorities during the last half of 2007 were to fill eight critical open positions; complete a client satisfaction survey; complete emergency purchases of items like a histology tissue processor, chemistry analyzer, and several needed microscopes; patch roof leaks; improve telephone communications; study the user fee structure; and relook at the renovation and expansion project, and more. An executive committee was formed that meets weekly to study high-priority laboratory issues and to plan and execute problem-solving activities.

Bacteriology/Mycology

James M. Donahue

The primary mission of the Bacteriology/Mycology Section 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 bacteria for two federal/state regulatory programs; CEM in equine and brucellosis in bovine.

2007 Highlights:

- Approximately 14,600 aerobic cultures were performed on samples submitted to the LDDC; significant bacterial pathogens were found in about 50% of the samples.
- Approximately 625 milk samples from dairy cows were tested for microorganisms that cause mastitis; more than 50% were positive for pathogenic microorganisms.
- Approximately 3,100 different bacterial isolates were tested to determine the antibiotics that could be used for their treatment in exposed animals.
- Approximately 7,250 samples from equines in Kentucky were cultured for the contagious equine metritis organism (CEMO). All horses tested were negative for the two bacteria that cause CEM, demonstrating that the disease no longer exists in horses in Kentucky.
- In cooperation with researchers at Michigan State University, the normal flora of the male genital tract of 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.
- Approximately 1,950 samples from horses were tested for the presence of leptospire, and tissues from 23 fetuses and/or placentas were positive.
- Using funding provided by the Grayson-Jockey Club Research Foundation Inc., the section provided data to prove that the bacteria responsible for the death of fetuses in natural and in experimentally induced cases of mare reproductive loss syndrome are identical to the bacteria found normally in the mouth and alimentary tract of horses.
- Nocardioform type bacteria were isolated from 15 cases of equine placentitis. In conjunction with the Molecular Biology section, they were identified as *Amycolatopsis* spp. (eight cases) and *Crossiella equi* (seven cases).
- In conjunction with the Molecular Biology section, 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.
- 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

Mary Harbour

The primary mission of the Clinical Pathology section 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 University of Kentucky equine and animal science researchers submit specimens to Clinical Pathology for monitoring various chemistry and hematology levels in their research animals. The section is in-

investigating additional testing, with plans to begin further testing to meet the needs of the agricultural community, companion animal community, and veterinarians.

2007 Highlights:

- In 2007, the LDDC purchased an Ace Alera Chemistry instrument which increased our capabilities for testing additional analytes. In 2008, the clinical pathology instruments will be interfaced to the new LDDC computer system.
- In addition, the section purchased a urinalysis instrument which automated urinalysis chemistry testing.
- There were several new tests offered during this year such as bile acids and Giardia antigen testing. Heartworm antigen, Lyme disease antibody, and canine Ehrlichia antibody ELISA tests were also introduced, but this testing has been transferred to the Serology section.
- Approximately 450 chemistry test panels were performed on equine, bovine, caprine, ovine, feline, canine, and other species. This represented more than 6,500 individual chemistry tests plus approximately 200 chemistry tests which were individually ordered.
- Approximately 500 complete blood counts and 500 manual differentials were performed. Approximately 146 specimens were tested for fibrinogen.
- Approximately 1,192 fecal specimens were submitted for fecal flotation and examination for ova and parasites. In addition, 200 specimens were submitted for cryptosporidia. Fifteen specimens were submitted for Giardia antigen, with three specimens being positive.
- Approximately 280 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, and vitreous eye fluids (necropsy) were other tests performed.

Epidemiology

Craig N. Carter

A contemporary veterinary epidemiology service was established at the Livestock Disease Diagnostic Center in January 2005. The primary goal of this new service is to provide animal disease surveillance, 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.

2007 Highlights:

- Laboratory information management systems are being implemented at the LDDC and the Breathitt Veterinary Center in Hopkinsville. These systems will be linked directly to the Kentucky Office of the State Veterinarian, effectively providing a statewide animal health information network. These projects are funded by USDA CSREES and Department of Homeland Security grants. The full network is scheduled to be fully operational by July 2008.
- A disease cluster detection engine was built based on the SatScan time-space permutation statistic. The engine monitors a 30-day window of specific laboratory events (e.g., necropsies, disease outbreaks) and alerts the Epidemiology section when a statistical cluster of events has occurred somewhere in the state. Outbreaks of bovine blackleg and equine leptospirosis were successfully detected followed by a medical situational awareness campaign to alert practicing veterinarians, farmers, and the Office of the State Veterinarian.
- The Epidemiology section continues to conduct field investigations on Kentucky farms as needed to help diagnose animal diseases. The section has a full-sized pickup truck with a well-supplied Bowie Veterinary Unit for this purpose.
- Dr. Noah Cohen et al. at Texas A&M University, Dr. Craig Carter, and Jackie Smith were awarded a Grayson-Jockey Club grant to study the concentrations of *Rhodococcus equi* in the air in barns and on paddocks to determine the effect on clinical disease. This study is scheduled to commence in 2008.
- The epidemiology section is pursuing a continuation of their USDA CSREES grant funding and also a second round of Department of Homeland Security funding for 2008.
- Jackie Smith, Scientist II, was hired as the new Epidemiology Section Chief when that position was vacated by Dr. Craig Carter.

Extension

Patricia B. Scharko

The Extension ruminant veterinarian provides educational programs for beef, dairy, goats, and sheep clientele, conducts field investigations on outbreaks of disease and production problems, conducts field-based clinical trial research on emerging disease problems, and works with veterinarians, producers, agriculture and natural resources county extension agents, specialists, and other professionals on livestock health issues.

2007 Highlights:

- Worked with seven Master Grazer programs involving 46 counties across the state, teaching prevention of animal disorders on pasture and parasite control with rotational grazing. Approximately 700 producers participated.
- Continued to teach the herd health session at nine Master Cattlemen groups with 310 participants

- Conducted Beef Quality Assurance programs across the state; updated the BQA manual
- Established a State Agricultural Response Team (SART). Joined Tetra Tech EM Inc. to produce a “Master Plan for Establishment of a State Agriculture Response Team” manual and provided a summit for key leaders in the state
- Involved in a grant from the national EDEN to prepare an Animal Emergency Biosecurity Manual and online course.
- Worked with Kentucky State University and UK Robinson Station to start an intranasal vaccine field trial utilizing available bovine IBR products to determine if pneumonia can be prevented. Continued a caseous lymphadenitis vaccine trial at both sites.
- Presented our field trial findings at several state and national conferences, including the Kentucky Veterinary Medical Association Conference, Georgia Veterinary Medical Association Food Animal Conference, the American College of Veterinary Internal Medicine forum, American Veterinary Medical Association Convention, and the United States Animal Health Association Conference.
- 35 farm investigations.

All of these efforts are to enhance awareness, recognition, and preparedness in rural Kentucky communities. Education about animal diseases and welfare is an important part of preparing for possible agroterrorism events.

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.

2007 Highlights:

- Approximately 12,000 PCR assays were run during 2007 on more than 7,000 specimens submitted.
- 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 (more than 2,000), *Streptococcus equi* subsp. *equi* (more than 1,800), and nocardioforms (more than 1,600). No neuropathogenic strains of EHV1 were detected in submissions from Kentucky animals during 2007 although they were detected in submissions from Wisconsin, Illinois, and California.

- This section is cooperating with the Bacteriology section and with researchers at the University of Kentucky’s Maxwell H. Gluck Equine Research Center and at Michigan State University on a project to determine the normal flora of the male genital tract of donkeys. 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.
- Using funding provided by the Grayson-Jockey Club Research Foundation Inc., the section cooperated with the Bacteriology section and provided data to prove that the bacteria responsible for the death of fetuses in natural and in experimentally induced cases of mare reproductive loss syndrome are identical to the bacteria found normally in the mouth and alimentary tract of horses.
- 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 Pathology Section of the Livestock Disease Diagnostic Center provides full services including complete necropsy examinations, histopathology, diagnosis for surgical biopsies, and cytology. Pathologists perform comprehensive necropsy examinations and order additional laboratory tests to be conducted. The lesions are correlated with other laboratory test results, including light microscopic examination of tissues, and a comprehensive report is prepared for every case undergoing pathologic examination.

Necropsy: A postmortem examination is conducted to identify any pathologic changes in the organs or tissues that would indicate disease, injury, or any other abnormal process that has resulted in impairment or loss of function.

Total Necropsy Cases	3,487
Avian	62
Bovine	878
Canine	272
Caprine	119
Equine	1,759
Feline	141
Ovine	108
Porcine	19
Miscellaneous	129

Histopathology: Tissues are prepared for light microscopic examination to reveal changes due to disease or other abnormal process. Tissues from 5,209 cases were processed and 39,263 microscope slides produced. These slides are examined by the pathologists. In addition to hematoxylin and eosin (H&E) stained tissue sections, special and immunochemical stains were done in 1,158 cases for the purpose of identifying microscopic organisms/agents that cause diseases or tissue antigens that define cell structures.

Biopsy: Possible lesions are often removed or sampled from live animals and sent to the laboratory for determination of the type of process and prognosis. These tissue specimens are processed and microscope slides prepared for light microscopic examination by the pathologists. Tissue samples representing 4,020 cases were processed and examined. A report with a diagnosis of the process was produced for each case.

Cytology: Preparations of cells harvested from possible tumors or other lesions or abnormal fluids are placed on microscopic slides and stained for cytologic examination under the microscope by the pathologists. Cytopathologic examinations were done, a diagnosis made, and a report generated for 397 cases.

Quality Assurance Program

Mary Harbour

The Livestock Disease Diagnostic Center Quality Program goal is based on the university's mission of improving service delivery while achieving excellent human relations (internally and externally), sound leadership, and effective communications. The quality system has been designed to focus 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 overall program goal is to continually improve service delivery, ensure quality results, and streamline work processes for maximum efficiency.

The quality system team has been preparing for the upcoming American Association of Veterinary Laboratory Diagnosticians (AALVD) accreditation inspection which is tentatively scheduled to occur in the fall of 2008. The quality system at the LDDC was begun in 2005 as a requirement of our AAVLD. For the past three years, a quality manager has been working with the LDDC sections to implement the required quality system. The organization of the system has been completed. The sections are finalizing the remaining procedures and placing them under the document control system. Several internal audits were conducted in 2006 and 2007.

The sections have developed a users' guide for clients that was posted on the LDDC Web site. This guide provides information about each test performed and fee per test. The quality work team conducted its first quality system management review in April 2007. Several areas of the laboratory were reviewed. To ensure quality results, the LDDC currently participates in various proficiency testing programs and check tests. These results, along with corrective action reports, client complaints, and internal audit reports, were reviewed. A review of the corrective action reports indicated that one of the reported problems was specimen suitability and specimen quality. The LDDC plans to provide educational sessions which will cover specimen collection, processing, and transportation to ensure the quality of samples received.

Serology

Meg Steinman

The Serology section provides accurate and timely results for both diagnostic and regulatory testing. This area receives specimens from both mammals and avians. The results generated from this section provide veterinarians data upon which to base their treatment decisions. In addition, this area performs regulatory testing, and the results of these tests enable Kentucky to export animals nationally and internationally. A variety of laboratory techniques are used for the testing including agar gel immunodiffusion (AGID), complement fixation (CF), hemagglutination inhibition (HI), microagglutination, plate agglutination, and enzyme-linked immunosorbent assays (ELISA).

In 2007, a total of 139,592 tests were performed by the Serology section. In the late summer/early fall, there was an outbreak of epizootic hemorrhagic disease (EHD), and the Serology section saw an increase in the number of antibody tests performed, testing 472 specimens. Serology also added a new test for Lyme disease antibody determination for canines and equines. In addition to implementing the new laboratory information system, goals for the Serology section for 2008 are to evaluate and possibly adopt ELISA methodology for additional tests, with the goal of decreasing turnaround time for result reporting while maintaining the quality of the laboratory results generated.

2007 Highlights:

Anaplasmosis	488
Avian influenza	11,374
Blue tongue	574
Bovine leukemia virus	1,122
Brucellosis	8,058
Canine brucellosis	77
Contagious equine metritis	1,177
Equine infectious anemia	44,729
FIV/FLV	21/26
Fungal serologies	594
Johne's disease	1,876
Leptospirosis	7,657
<i>Mycoplasma gallisepticum</i>	25,226
<i>Mycoplasma synoviae</i>	25,225
<i>Neospora caninum</i>	417
Salmonella pullorum-typhoid	9,951

Toxicology

Cynthia L. Gaskill

The primary mission of the Toxicology Section at 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.

2007 Highlights:

- A veterinary clinical toxicologist was hired to provide the toxicological consultation service and to update the capabilities of the Toxicology section.
- Old equipment has been disposed of and is currently being replaced with new, state-of-the-art analytical instrumentation 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 results are accurate, reproducible, and meaningful.
- Several toxicological research projects have been instituted in conjunction with UK faculty members in the College of Agriculture.

In 2007, the toxicology section received samples from more than 1,250 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 2008. 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 Livestock Disease Diagnostic Center provides diagnostic virology support to the laboratory pathologists, large and small animal veterinarians, the Commonwealth, and USDA veterinarians.

2007 Highlights:

- This section provides 50 different tests including fluorescent antibody tests to detect antigens of viruses in tissues, serology tests to detect antibodies to viruses, virus isolations for cattle, horses, sheep, pigs, goats, cats, dogs, birds, reptiles, etc., as well as electron microscopy and various tests for the detection of viral antigens of influenza and bovine viral diarrhea virus. This section maintains 10 tissue culture cells lines that are used routinely.
- The section performed 28,284 tests during 2007. Of this total, 13,149 were virus neutralization tests to detect viral antibodies completed to meet regulatory requirements for the equine industry.
- Cattle producers in Kentucky have continued to utilize the screening test to detect animals persistently infected with bovine viral diarrhea virus in their herds. The number of animals tested was up 50% from the previous year. Identification and removal of this important source of disease problems will give added value to one of our most important commodities.

Regulatory Services

Mission

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 391 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 1,038 fertilizer reports, 3,021 feed reports, 790 seed reports, and 81 milk reports. Reports were regularly checked for accuracy and compared to field audits of the submitting firms.

The 2007 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, 2006, to June 30, 2007, from fees, licenses, and testing services provided by the Division was as follows:

Industry	2007 Income
Feed	\$1,120,390
Fertilizer	614,691
Milk	192,896
Seed tags and licenses	311,502
Seed testing	59,018
Soil testing	247,218
Total	\$2,545,715

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 and research programs, and to support agriculture in Kentucky.

The State Feed Law became effective on June 11, 1906; in 2007, the laboratory completed the first year of the second century supporting the feed regulatory program. The laboratory analyzed 3,101 fertilizer samples and 3,539 feed samples. In addition, the laboratory provided analytical support for 55,194 agriculture-related samples, i.e., soil, manure, greenhouse, water, litter, and research samples. More than 600 special sample analyses for protein and more than 40 fat and fiber research sample analyses were performed for the College of Agriculture. The laboratory participated in several scientific meetings: Southern Section AOAC, AAPFCO, AAFCO, Fertilizer Methods Forum, and ASFFPCO. Laboratory personnel participated on numerous committees in these scientific organizations, including serving as an AAPFCO committee vice chair and an AAFCO investigator.

The laboratory supported the yearly pet food survey and provided for investigation of several animal death cases. Low-level antibiotic analyses were conducted for the feed program to monitor contamination and other issues. Microscopical examination continues to be used to monitor quality and ingredients of feeds. More than 100 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 continued to participate in mycotoxin and microscopy check sample programs. The laboratory participated in a monthly inter-laboratory aflatoxin share sample program. The laboratory routinely provided program support using approximately 65 different analytical methods. Samples were also submitted to and analyzed by commercial and other regulatory programs to provide additional analytical method support and to ensure the quality of the Regulatory Services laboratory results.

A new chromatographic mass spectroscopy system was implemented and analyzed corn samples for mycotoxins. This instrument will be used for confirmatory measurements of mycotoxins in ingredients and complete feeds in the future.

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”).

2007 Highlights:

- Administered actions on 3,420 official and 112 unofficial samples of commercial feed involving 20,918 tests to monitor about 3 million tons of commercial mixed feed and feed ingredients distributed in Kentucky.
- Administered a cooperative program with the FDA to inspect four feed mills that mix restricted drugs in feed and to inspect these mills for compliance with the FDA’s national BSE Rule. An additional 60 BSE inspections were contracted with the FDA for mills and feed dealers not required to be licensed with the FDA.
- Conducted 9,000 label reviews and maintained product registration for about 15,000 products from more than 1,000 companies.

Fertilizer Regulatory Program

D.L. Terry

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.

2007 Highlights:

- Administered actions on 3,040 official and 60 unofficial samples of fertilizer involving 9,310 chemical tests.
- The official samples represented about 57,300 tons out of the approximately 983,700 tons of fertilizer distributed in Kentucky during 2007, or about 6 percent.
- Reviewed labels and registered 3,595 products from 482 firms and issued licenses to 174 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.

2007 Highlights:

- 10 inspectors completed more than 5,016 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 the FDA’s BSE regulations.
- Two inspectors visited and sampled small package specialty feed, fertilizer, and seed products in urban markets.
- Two inspectors made 209 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	3,420
Fertilizer	3,040
Seed	2,515
Milk	3,489

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 \$182 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 and processors. The milk program also operates a laboratory that is available for Kentucky producer, processor, and handler service testing.

2007 Highlights:

- Reviewed and issued licenses to four transfer stations, 20 milk handlers, 19 laboratories, 64 testers, and 360 sampler-weighers (milk-haulers, receivers, and samplers).
- Analyzed and administered action on 3,489 official samples.
- Administered a monthly milk laboratory quality control check sample program through the distribution of 2,508 check samples to the 19 licensed laboratories to ensure accurate component testing procedures.
- Conducted 18 pay-record and 19 raw milk receiving manifest audits.
- Conducted 37 milk laboratory inspections.
- Collaborated with Kentucky Cabinet for Health Services Milk Safety Branch to train sampler-weighers and processor receiving personnel.
- Trained and examined 67 new sampler-weighers and nine new testers.
- Conducted 18 inspections of raw milk transfer stations.
- Conducted 422 sampler-weigher inspections.
- Collaborated with the Cooperative Extension Service and the Kentucky Dairy Development Council in conducting a series of dairy producer meetings across Kentucky. Approximately 420 participants attended this series of meetings.
- Participated with the Department of Biosystems and Agricultural Engineering in a Homeland Security-funded project to develop an electronic security system for securing bulk milk during transport.

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 2007, 98 percent of service samples accepted into the laboratory were submitted by Kentucky firms or individuals. Services to customers in 2007 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. 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. More than 20,000 different tests were performed by laboratory personnel in 2007.

In addition to routine laboratory activities, the seed program participated in various professional development and educational programs and developed a seed demonstration kit for agricultural, vegetable, and weed identification.

2007 Highlights:

Sample Type	Completed Samples
Official samples	2,515
Research samples	506
Service samples	5,125

Kinds of Seed Tested

Grains	1,981
Grasses	1,936
Vegetables/Edibles	1,136
Tobacco	1,132
Legumes	1,080
Ornamentals/Other	682
Native species	174

Certified Crops

Tobacco	1,132
Other crops	201
Total Samples	8,145

Laboratory Tests Conducted

Endophyte	265
Germination	9,305
Purity	8,358
Trait testing	92
Vigor	210
Other	487
Total Analyses	18,717

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, 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.

2007 Highlights:

- Performed inspections and sampled agricultural, lawn, turf, and garden seeds at more than 600 wholesale and retail locations.
- Collected and tested 2,515 official seed samples.
- Issued stop-sale orders on 324 official seed samples and 290 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 216 agricultural permits and 40 vegetable and flower permits to label seed.
- Registered 467 seed dealers and 27 non-certified custom conditioners.
- Provided training to firms on labeling requirements, mixing procedures, and batching records.

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 contains information on our services and calculators for determining fertilizer, lime, and manure application rates. The site is at www.soils.rs.uky.edu.

On July 1, agricultural lime recommendations were modified. Previously, lime recommendations were based on an average lime quality of 67% RNV (relative neutralizing value). Lime recommendations are now made on a 100% RNV basis with a calculation required to determine agricultural lime recommendation based on the RNV. The change was made to improve lime quality in the state through improved awareness of the value that measures lime quality.

On September 1, the Lexington laboratory started using an automated LabFit instrument for determining soil pH and buffer pH.

The number of samples analyzed in 2007 were:

Type	Number	% Change
Agriculture	38,375	20
Home lawn and garden	6,925	-4
Commercial horticulture	696	-15
Greenhouse media	41	156
Research	6,922	-14
Atrazine residue in soil	12	-46
Animal waste	260	-6
Nutrient solution	30	15
Special research solutions	1,933	24
Total	55,194	13

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, series of "brown bag" seminars to facilitate communication regarding invasive species, and a fall conference.

Landscape Change Conference: Staff at the Center are assisting Dr. Brian Lee in the planning and implementation of a regional "Mapping and Monitoring Land Resources Change" conference.

SB271 Groundwater Research Program: By working with the SB271 Groundwater Program, the Center supports groundwater research and education efforts.

UK's Sustainability Committee: The Center participates in the university's Sustainability Committee. Dr. Carol Hanley, the Center's director of education and communications, is co-chair of this committee.

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.

Wetland Restoration Institute: With funding from Eastern Kentucky PRIDE and Agri-Drain Corporation, the Center co-sponsored the first annual Wetland Restoration Institute with staff from the Daniel Boone National Forest. Twenty-seven attendees from Kentucky, Georgia, Michigan, Minnesota, Mississippi, Ohio, Pennsylvania, Michigan, British Columbia, and India met in the forest to learn about restoring and constructing wetlands.

Primary Partners

- U.S. Forest Service
- San Dimas Technology and Development Center
- Eastern Kentucky PRIDE
- FMSM Engineers
- Daniel Boone National Forest

- Ducks Unlimited
- USDI FWS
- USDA NRCS
- Shelton Environmental Education Coalition
- British Columbia Ministry of the Environment, British Columbia Wildlife Federation
- Copperhead Environmental Consulting Inc.
- Association of State Wetland Managers
- East Kentucky Power Cooperative Inc.

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 coming 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.

Energy Education for Teachers: The Center is conducting a series of workshops for central Kentucky to explore many different facets of energy use and conservation.

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 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 2007, as reported in the USDA Current Research Information System (CRIS) database, follow.

Agricultural Economics

- Benefits and Cost of Natural Resources Policies Affecting Public and Private Lands—Fleming, R.A.
- 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.
- Consumer Choice Regarding Food and Health—Maynard, L.J.
- Impact of Food Safety Scares on the Food Supply Chain in an Environment of Highly Integrated Monopolistically Competitive Agriculture and Food Industries—Saghalian, 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.
- Risk Management and Profit Potential of Alternative Production Practices, Enterprises, and Technologies—Dillon, C.

Animal and Food Sciences

- Animal Manure and Waste Utilization, Treatment, and Nuisance Avoidance for a Sustainable Agriculture—Cromwell, G.L.
- 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.
- Calcium and Phosphorus Nutrition of Pregnant and Lactating Mares—Lawrence, L.M.
- 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.
- Improving the Sustainability of Livestock and Poultry Production in the United States—Cromwell, G.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.
- Interpreting Cattle Genomic Data: Biology, Applications, and Outreach—Matthews, J.C.
- 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.
- Proteomic Analysis 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.
- Demand-Controlled Ventilation (DCV) for Residential Indoor Air Quality Control—Colliver, D.G.
- 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.
- Optical Sensor Measurement of Food Composition Based on Light Scattering Distribution—Payne, F.A.
- 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.
- The Science and Engineering for a Biobased Industry and Economy—Nokes, S.E.
- 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—Burmeister, L.
- 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.
- 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.
- Biology and Management of Insects Attacking Turf and Woody Landscape Plants—Potter, D.A.
- Dynamic Soybean Pest Management for Evolving Agricultural Technologies and Cropping Systems—Yeagan, K.V.
- Ecology and Management of European Corn Borer and Other Lepidopteran Pests of Corn—Obycki, J.
- Effects of Prey Biodiversity on Pest Regulation by Generalist Predators—Harwood, J.D.
- Genomic Approaches to Analyses of Immune-Suppressive Genes of the *Campolepis sonorensis* Polydnavirus—Webb, B.A.
- Herbivory in Deciduous Forests: Implications for Forest Regeneration and Restoration—Rieske-Kinney, L.K.
- Impacts of Interactions among Generalist Arthropod Predators in Two Complex Food Webs: Vegetable-Crop Gardens and Forest-Floor Leaf Litter—Wise, D.H.
- 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.
- Potential for Evolution of Resistance to Synthetic Pheromone—Haynes, K.F.
- Phylogeny and Biodiversity of Hymenopteran Biological Control Agents—Sharkey, M.
- Research and Development Leading to an Integrated Mosquito Management Program for Kentucky—Brown, G.C.
- S1029 Improved Methods to Combat Mosquitoes and Crop Pests in Rice Fields—Dobson, S.L.
- Systematics and Biodiversity of Biological Control Agents with Special Reference to the Braconidae—Sharkey, M.J.

Forestry

- Assessing the Invasion Pattern of Exotic Plants in Forest Ecosystems in Kentucky—*Fei, S.*
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.*
Restoration of the American Peregrine Falcon (*Falco peregrinus anatum*) to Cliff Habitats in Kentucky—*Lacki, M.J.*
RREA Program—*Stringer, J.W.*
The Ecological Role of Large Mammals in the Forests of Kentucky and the Eastern United States: Implications for Conservation—*Maehr, D.S.*

Horticulture

- 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—*Masabni, J.G.*
Marketing, Managing, and Producing Environmental Plants in a Technical and Economically Efficient Manner—*McNiel, R.E.*
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—*Kurtunal, 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 Sorbitol Dehydrogenase Activity during Apple Fruit Development: Genotypic Differences and the Impact of Cultural Practices—*Archbold, D.D.*
Rootstock and Interstem Effects on Pome- and Stone-Fruit Trees—*Masabni, J.G.*
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.*
Regulation of Expression and Activity of Sorbitol Dehydrogenase in Apple—*Archbold, D.*

Human Environmental Sciences

- Antioxidant Nutrients, Reactive Oxygen Species, and Oxidative Stress—*Chou, C.K.*
Dietary Antioxidants, NF- κ B, and Carcinogenesis—*Glauert, H.P.*
Mechanisms of Anti-Inflammatory Action of Eicosapentaenoic Acid (EPA)—*Chen, L.*

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.*
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.*
Endophyte Effects on the Structure and Function of Tall Fescue Pasture—*McCulley, R.L.*
Fate and Ecological Effects of Livestock Antibiotics in Soils—*D'Angelo, E.*
Hydrogeology: Genesis, Properties, and Distribution of Hydromorphic Soils—*Karathanasis, A.D.*
Identification of Soybean Flowering Pathway Genes Using E Gene Near Isogenic Lines—*Kumudini, S.*
Mineral Controls on P Retention and Release in Soils and Soil Amendments—*Karathanasis, A.D.*
Plant Genetic Resources Conservation and Utilization—*Phillips, T.D.*
Regulation of Gene Expression during Plant Embryogenesis—*Perry, S.E.*
Regulation of Isoprenoid Metabolism in Plant-Pathogen Interactions—*Chappell, J.*
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.*
Turfgrass Management Practices in Kentucky—*Williams, D.W.*
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—*Kachoo, P.*
Defining RNA and Protein Factors Affecting Tombusvirus Replication—*Nagy, P.D.*
Ecological and Genetic Diversity of Soilborne Pathogens and Indigenous Microflora—*Seebold, K.W.*
Dissecting Defense Signaling Pathways in Soybean and Arabidopsis—*Kachoo, A.*
Epidemiology, Genetic Diversity, and Strategies to Control Bean Pod Mottle Virus—*Ghabrial, S.A.*
Genes Controlling Invasive Growth in the Rice Blast Fungus *Magnaporthe oryzae*—*Farman, M.L.*

- Genetics and Biochemistry of Alkaloid Production by Endophytes—*Schardl, C.L.*
Genomic Studies of the Model Phytopathogenic Fungus *Magnaporthe grisea*—*Farman, M.*
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.*
Mechanisms of the Transition between Biotrophy and Necrotrophy in a Hemibiotroph—*Vaillancourt, L.*

Veterinary Science

- Cartilage-Specific Fibronectin Isoform—*MacLeod, J.N.*
Control of Equine Infectious Anemia (EIA)—*Issel, C.J.*
Development of Strategies to Increase Peripheral Insulin Responsiveness in Dietary-Induced Insulin-Resistant Horses—*Fitzgerald, B.P.*
Effect of Aging on the Immune Response of Horses—*Horofov, 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.*
Identification and Characterization of Immunodominant Antigens from the Coccidian Parasite *Sarcocystis neurona*—*Howe, D.K.*
Immunologic Requirements for Vaccine Mediated Prevention of Equine Herpesvirus Neurologic Disease—*Allen, G.P.*
Innate Immune Responses to Influenza Virus Infection—*Chambers, T.*
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 (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.*
Reactivation and Transmission of Latent Equine Herpesvirus-1 in Pregnant Mares: Role as Risk Factors for Equine Herpesvirus Abortion—*Allen, G.P.*
Risk Factors for Equine Herpesvirus Abortion—*Allen, G.P.*

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, 2007–December 31, 2007) 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—\$796,753

- A Program of Technical Assistance to Improve the Quality of Life for Low-Income Communities in Kentucky, Rural Housing Service, \$300,000—Davis, A., Freshwater, D., Isaacs, S., Maurer, R., Meyer, A., Snell, W.
- Annie's Project: Risk Management Education for Kentucky Farm Women, Texas A&M University, \$59,981—Meyer, A., Badenhop, S., Halich, G., Hunter, J.
- Annie's Project: Risk Management for Farm Women, Kentucky Governor's Office of Agricultural Policy, \$6,500—Meyer, A., Badenhop, S., Halich, G., Hunter, J.
- Consumer Reaction to Health Messages about Fish Consumption, University of Alberta, \$6,332—Maynard, L., Nickoloff, M., Saghaian, S.
- Cooperatives Intern Program, Kentucky Center for Cooperative Development, \$10,000—Woods, T.
- Feasibility Study for Tapps Dairy and Creamery, Tapps Dairy and Creamery, \$28,150—Woods, T.
- Implement Plan of Work for the Southern Region Sustainable Agriculture Research and Education (SARE) Professional Development (PDP) Program, University of Georgia, \$53,317—Meyer, A.
- Kentucky Agricultural Development Board: Pilot Farm Management Cost-Share Program, Kentucky Governor's Office of Agricultural Policy, \$2,100—Robbins, L.
- Program Evaluation of the Agricultural Development Board Investments, 2001-2006, Kentucky Governor's Office of Agricultural Policy, \$218,400—Infanger, C., Maurer, R.
- Retirement Portfolio Planning for Farmers, Texas A&M University, \$49,961—Dillon, C.
- Scholarships for Thai Ministry of Agriculture Officials, Thai Ministry of Agriculture and Cooperatives, \$4,012—Reed, M.
- Technical Assistance to Romanian Agriculture, Foreign Agricultural Service, \$42,050—Reed, M.
- Technical Assistance to the Extension System in Serbia, Foreign Agricultural Service, \$15,950—Reed, M.

Agriculture Programs

Total—\$120,000

- Kentucky Sheep and Goat Herder Curriculum—Phase I, University of Georgia, \$90,000—Henning, J., Hutchens, T., Yeagan, R.
- Southern Region Sustainable Agriculture Research and Education (SARE) Professional Development Program (PDP) Model State Plan, University of Georgia, \$20,000—Henning, J.
- Training Program—Southern Region Sustainable Agriculture Research and Education (SARE) Professional Development Program (PDP) Model State Plan, University of Georgia, \$10,000—Henning, J.

Animal and Food Sciences

Total—\$3,005,040

- Assessment of Distillers Dried Grains with Solubles (DDGS) from Ethanol Production on Performance and Carcass Quality of Growing-Finishing Swine, National Pork Board, \$52,000—Cromwell, G.
- CSREES Shared Faculty Member, Cooperative State Research Education and Extension, \$25,000—Cromwell, G.
- Essential Amino Acid and Fatty Acid Studies in Cats, Hills Pet Nutrition Inc., \$224,614—McLeod, K.
- Polycyclic Aromatic Hydrocarbon-Medicated STAT Signaling and Implications in Vascular Inflammation, American Heart Association, \$21,000—Hennig, B., Oesterling, E.
- Microbial and Cell Assay, Tribo Flow Separations LLC, \$5,000—Hicks, C.
- Nutrient Utilization in the Dog, Hills Pet Nutrition Inc., \$299,750—Harmon, D., McLeod, K.
- Nutrition and Superfund Chemical Toxicity, National Institute of Environmental Health Sciences, \$2,250,176—Hennig, B., Gaetke, L.
- Sponsored Student Stipend, Alltech Biotechnology Inc., \$30,000—Lawrence, L.
- Student Sponsorship Agreement, Alltech Biotechnology Inc., \$30,000—Harmon, D.
- U.S. DAIR eXNET—A National Dairy Information and Communication Resource, University of Nebraska, \$67,500—Amaral-Phillips, D., McAllister, A.

Associate Dean/Director

Total—\$2,239,973

- Acquisition of Goods and Services, Agricultural Research Service, \$18,297—Cox, N.
- Acquisition of Goods and Services, Agricultural Research Service, \$39,500—Cox, N.
- ARS/SCA Cooperative Agreement, Agricultural Research Service, \$2,182,176—Cox, N.

Biosystems and Agricultural Engineering

Total—\$2,955,449

- A Cooperative Extension Program for Kentucky's Building Systems Energy Needs 2007-2008, Kentucky Office of Energy Policy, \$95,500—Fehr, R.
- Ammonia Gas Sensors for Agricultural Applications, Synkera Technologies Inc., \$15,535—Gates, R.
- Bacterial Adaptations for Enhanced Cellulose Utilization: A Systems Approach, University of Tennessee, \$250,000—Nokes, S., Strobel, H.
- Cane Run and Royal Spring Watershed Based Plan Project, Kentucky Natural Resources Environmental Protection Cabinet, \$666,564—Workman, S., Agouridis, C., Gumbert, A., Higgins, S., Stringer, J.

- Canola and Sunflower for Oil/Biofuel in Kentucky, Kentucky Office of Energy Policy, \$51,945—McNeill, S., Herbek, J., Murdock, L.
- Cooperative Extension Radon and Indoor Air Quality Education, Kentucky Health Services Cabinet, \$105,000—Fehr, R.
- Development of a Crop-Cut-Edge Detection Methodology for Agricultural Field Operations, Case New Holland America LLC, \$62,000—Shearer, S.
- Development of an Optical Backscatter Sensor Technology for Monitoring and Controlling Meat Emulsification during the Chopping Process, Kentucky Science and Technology Co. Inc., \$99,996—Castillo, M., Payne, F., Xiong, Y.
- Development of Line-Scan Image Algorithms for Inspection of Poultry Carcasses, Agricultural Research Service, \$10,000—Gates, R.
- Energy Seed Grant Technical Merit Review, Kentucky Office of Energy Policy, \$27,963—Gates, R.
- Enhanced Building Energy Efficiency Technology Deployment, Kentucky Office of Energy Policy, \$278,341—Fehr, R., Collier, D.
- Enhancing Water Quality Education in Kentucky, Texas A&M University, \$61,000—Workman, S., Gumbert, A.
- Fan Assessment Numeration Systems (FANS) for Agricultural Building Ventilation Measurement in Emissions Testing, Purdue University, \$60,000—Gates, R., Sama, M.
- Feasibility of Ethanol Production from Sweet Sorghum in Kentucky, Kentucky Office of Energy Policy, \$111,664—Montross, M., Crofcheck, C., Dillon, C., Pfeiffer, T., Shearer, S.
- Gaseous Production from Impermeable Swine Waste Storage Tanks and Its Abatement Using Biofilters, Cooperative State Research Education and Extension, \$487,087—Gates, R., Higgins, S., Singh, A., Wilkerson, E.
- Poultry House Evaluation Service, Kentucky Poultry Federation, \$395,566—Overhults, D., Gates, R., Pescatore, A.
- Programmable Controls for Solid-Liquid Settling Basins, Natural Resources Conservation Service, \$42,677—Higgins, S.
- Renewable Energy/Energy Efficiency (REEE) Program Support (07-08), Kentucky Office of Energy Policy, \$54,520—Collier, D.
- Spray Nozzle Control for Preservation of Vegetated Conservation Features, Natural Resources Conservation Service, \$74,897—Shearer, S., Higgins, S., Mueller, T.
- Studying Ensilability of Corn Stover Harvested Fractions, Idaho National Energy and Environment, \$6,000—Montross, M.

Community and Leadership Development

Total—\$951,133

- Engaging Youth, Serving Community (EYSC4) Initiative, National 4-H Council, \$811—*Jones, K.*
- Engaging Youth, Serving Community (EYSC5) Initiative, National 4-H Council, \$25,000—*Jones, K.*
- Kentucky Entrepreneurial Coaches Institute: Expansion into South-Central Kentucky, Kentucky Governor's Office of Agricultural Policy, \$883,545—*Hustedde, R., Jones, L.*
- Leadership Development for Rural FFA Members through Civic Engagement, National FFA Organization, \$33,527—*Horstmeier, R.*
- University of Kentucky as a Land-Grant Leader: Improving Teacher Education in the Commonwealth, UK Perkins Leadership Project, Kentucky Department for Technical Education, \$8,250—*Horstmeier, R.*

Entomology

Total—\$8,447,726

- 20 Hydroxycyclohexenone Suppression of Juvenile Hormone Response, National Science Foundation, \$130,367—*Palli, S.*
- An Innovative Approach for Elucidating Trophic Relationships of an Invasive Forest Pest, Kentucky Science and Technology Co. Inc., \$19,997—*Rieske-Kinney, L., Harwood, J.*
- Cooperative Agricultural Pest Survey, Animal and Plant Health Inspection Service, \$354,227—*Obrycki, J., Dillon, P.*
- Development of the Regional Multi-State Insect Trapping Network for Use in Issuing Scouting Alerts and Predicting Potential Field Crop Damage in the Heartland, Cooperative State Research Education and Extension, \$23,838—*Lucas, P., Johnson, D.*
- Development of Tightly Regulated Ecdysone Receptor-Based Gene Switches, Dow AgroSciences, \$25,000—*Palli, S.*
- Development of Tightly Regulated Ecdysone Receptor-Based Gene Switches, Consortium for Plant Biotechnology Research Inc., \$84,560—*Palli, S.*
- Eradication of a Primary Filariasis Vector Population at an Endemic Field Site, National Institute of Allergy and Infectious Diseases, \$316,682—*Dobson, S.*
- Establishment of a Kentucky State Contract for the Southern Region IPM Center, North Carolina State University, \$25,000—*Lucas, P.*
- Functional Genomics Studies on Nuclear Receptors: Target Sites for Insecticide Development and Resistance Management, Cooperative State Research Education and Extension, \$567,945—*Palli, S.*
- Genetic Modification of Mosquito Populations to Make Them Incapable of Transmitting Dengue Virus, University of Queensland, \$354,114—*Dobson, S.*
- Hemlock Woolly Adelgid Sampling Surveys, Kentucky Natural Resources Environmental Protection Cabinet, \$7,500—*Obrycki, J.*
- Isolation and Identification of Chemical Compounds from Volatiles Emitted by Bed Bugs: Their Role in Natural Aggregations and Their Utility in Monitoring Populations, Bayer CropScience GmbH, \$130,000—*Haynes, K., Potter, M.*

- Managing Flatheaded Appletree Borer in Nursery-Grown Maples, University of Florida, \$5,000—*Potter, D.*
- Migration Patterns for Aphid Pests of Small Grains as Indexed by Capture in an Aphid Suction Trap, Kentucky Small Grain Growers Association, \$2,388—*Johnson, D.*
- Migration Patterns for Soybean Aphid as Indexed by Capture in an Aphid Suction Trap, Kentucky Soybean Promotion Board, \$2,429—*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.*
- MorphBank: Web Image Database Technology for Comparative Morphology and Biodiversity Research, Florida State University, \$15,005—*Sharkey, M.*
- Natural Enemies Affecting Abundance of Native and Invasive White Grubs and Compatibility of Golf Course Management Practices with Biological Controls, U.S. Golf Association, \$60,000—*Potter, D.*
- Novel Active Insecticidal Compounds from Kentucky Native Plants, Naprogenix, \$58,850—*Palli, S.*
- Private Pesticide Applicator, Kentucky Department of Agriculture, \$55,000—*Townsend, L.*
- Supplemental Vector Intervention Required to Eliminate Lymphatic Filariasis in the South Pacific, Bill and Melinda Gates Foundation, \$5,376,395—*Dobson, S.*
- The Regulation of Innate Immune Responses to Endoparasites in Lepidopteran and Dipteran Larvae, Cooperative State Research Education and Extension, \$374,000—*Webb, B.*
- TIGER: Thailand Inventory Group for Entomological Research, National Science Foundation, \$150,000—*Sharkey, M.*
- Transgenic Corn for Corn Earworm Management, Monsanto Co., \$6,000—*Bessin, R.*
- Use of Baculovirus for Season-Long Control of Black Cutworms on Golf Courses and Compatibility with Soil Insecticides and Resistant Turfgrasses, U.S. Golf Association, \$60,000—*Potter, D.*

eXtension

Total—\$850,421

- ECOP/CSREES eXtension-Supplement, University of Nebraska, \$539,930—*Wood, C., Craycraft, C.*
- eXtension—The Transformation of Cooperative Extension, University of Nebraska, (\$25,000)—*Wood, C., Craycraft, C.*
- HorseQuest—National Equine Resource Team, University of Nebraska, \$22,000—*Griffin, A., Coleman, R.*
- HorseQuest—National Equine Resource Team—Year 2, Part 1, University of Nebraska, \$20,000—*Griffin, A.*
- The Transformation of Cooperative Extension, University of Nebraska, \$243,491—*Craycraft, C., Wood, C.*

Extension Field Programs

Total—\$37,500

- Adair County 4-H After-School Program, National 4-H Council, \$37,500—*Rose, M.*

Family and Consumer Sciences

Total—\$1,716,046

- Kentucky Food Stamp Nutrition Program, Kentucky Families and Children Cabinet, \$1,393,841—*Vail, A., Stephenson, L.*
- Mental Healthiness Aging Initiative (MHAI), Cooperative State Research Education and Extension, \$322,205—*Murray, D.*

Family Studies

Total—\$585,667

- Professional Development for Family and Consumer Sciences Teacher Educators, Kentucky Department for Technical Education, \$5,500—*Mimbs, C., Ellington, V.*
- The UK/BHMP Cooperative Relationship to Establish a Pro-Marriage/Pro-Family Initiative among Central Kentucky's Communities and Institutions, Kentucky Health Services Cabinet, \$580,167—*Vail, A.*

Forestry

Total—\$739,485

- A Calf Survival, Meningeal Worm Impacts Dispersal and Population Expansion in an Eastern Kentucky Elk Herd, Kentucky Department of Fish and Wildlife, \$128,000—*Maehr, D.*
- Influences of Geology and Tree Species Composition on the Response of Forest Nutrient Dynamics to an Exotic Pest, National Science Foundation, \$40,344—*Arthur, M.*
- Development of a State Management Plan for Aquatic Nuisance Species in Kentucky, Kentucky Department of Fish and Wildlife, \$7,800—*Maehr, D., Barnes, T.*
- Dispersal and Population Expansion of the Black Bear in Eastern Kentucky, Kentucky Department of Fish and Wildlife, \$90,500—*Maehr, D.*
- Effects of Forest Practices of Insect Prey and Activity Levels of Forest-Dwelling Bats in Tennessee, Nature Conservancy, \$9,900—*Lacki, M.*
- 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.*
- Fire and New Oak Seedlings, Forest Service, \$16,000—*Arthur, M.*
- Heritage Land Conservation Fund Publication, Kentucky Heritage Land Conservation Fund, \$10,000—*Barnes, T.*
- Japanese Spirea Control with Herbicides in the Big South Fork NRRRA, Department of the Interior, \$13,700—*Barnes, T.*
- Kentucky Woodlands Magazine Production I, Kentucky Natural Resources Environmental Protection Cabinet, \$30,000—*Stringer, J.*

Kentucky Woodlands Magazine Production II, Kentucky Natural Resources Environmental Protection Cabinet, \$15,419—*Stringer, J.*
Long-Term Ecological Research at Hubbard Brook Experimental Forest, Institute of Ecosystems Studies, \$34,789—*Arthur, M.*
Planting Appropriately Sized Trees under Utility Lines, Kentucky Natural Resources Environmental Protection Cabinet, \$8,152—*Hill, D.*

Techniques for Establishing Woody Biomass Plantations on Surface Mines as Feedstocks for Energy Production, Kentucky Office of Energy Policy, \$174,166—*Barton, C., Agouridis, C., Lhotka, J., Warner, R.*

Silvicultural Prescriptions for Degraded Hardwood Stands, Appalachian Hardwood Manufacturers Inc., \$10,000—*Stringer, J.*

Status, Distribution, and Reproductive Characteristics of River Otters in Kentucky, Kentucky Department of Fish and Wildlife, \$50,715—*Lacki, M.*

The Common Raven in Cliff Habitat: Detectability and Occupancy, Kentucky Department of Fish and Wildlife, \$60,000—*Cox, J., Maehr, D.*

4-H Central Operations

Total—\$282,549

2008 Operation Military Kids, Kansas State University, \$50,000—*Reed, D.*

2008 Operation Military Kids—Surge, Kansas State University, \$12,549—*Stivers, W.*

Positive Youth Development Partnership, Administration for Children and Families, \$220,000—*Delahanty, T., Kurth, J.*

Horticulture

Total—\$2,453,676

An SDSS for Expanding Viticulture in North-Central Kentucky and Southern Ohio, Cornell University, \$10,000—*Kurtural, S.*

Assembling the Consumer Horticulture Community of Practice to Develop a FAQ Database and Ask the Expert Interface for the Consumer Horticulture Community of Interest, University of Nebraska, \$60,000—*Durham, R.*

Collaborative Research: Maintenance of a Functional Proteome through Dynamic Repair, National Science Foundation, \$6,000—*Downie, A.*

Efficacy of Plant Growth Regulators on Branch Architecture of Container-Grown Trees and Shrubs, University of Florida, \$3,000—*Fulcher, A.*

Infrastructure Support for Growth of Kentucky's Grape and Wine Industry, Kentucky Department of Agriculture, \$290,000—*Strang, J.*

Isolation and Identification of Plant-Specific Peptide Deformylase Inhibitors from Soil Microorganisms for Use as Broad-Spectrum Herbicides and Selectable Markers, Kentucky Science and Technology Co. Inc., \$19,976—*Houtz, R., Williams, M.*

Kentucky Horticulture Council, Grant 4, Kentucky Horticulture Council, \$2,044,700—*Ingram, D., Woods, T.*

Progress and Continuation Plans for the eXtension Consumer Horticulture Community of Practice, University of Nebraska, \$20,000—*Durham, R.*

Kentucky Tobacco Research and Development Center

Total—\$651,253

Development of Screens for Drugs in Alcohol Dependence, National Institute on Alcohol Abuse and Alcoholism, \$651,253—*Littleton, J.*

Landscape Architecture

Total—\$100,000

A Land Use Modeling Study in the Lexington-Fayette Area of Central Kentucky, Kentucky Transportation Cabinet, \$100,000—*Lee, B.*

Livestock Disease Diagnostic Center

Total—\$501,535

Bovine Spongiform Encephalopathy (BSE) Surveillance Testing, Kentucky Department of Agriculture, \$23,035—*Harrison, L.*

Diagnostic Laboratory Services for Farmers and Agribusinesses, Kentucky Department of Agriculture, \$478,500—*Carter, C.*

Nutrition and Food Science

Total—\$203,413

Cooperative Agreement with USDA/CSREES-CYFAR Technical Assistant Liaison, Cooperative State Research Education and Extension, \$46,000—*Kurzynske, J., Stivers, W.*

CYFARnet Liaison, Cooperative State Research Education and Extension, \$46,000—*Kurzynske, J.*

Food Safety Social Marketing Campaign Targeting University of Kentucky Undergraduate Students, Rutgers University, \$5,000—*Roseman, M.*

Innovative Food Safety Education for Low Literacy Food Service Employees Using Enhanced and Interactive Distance Learning, University of Connecticut, \$6,413—*Kurzynske, J.*

Promoting Life Skills in Middle School Youth, Cooperative State Research Education and Extension, \$100,000—*Kurzynske, J., Jones, K.*

Plant and Soil Sciences

Total—\$2,539,030

Accelerating the Development of FHB-Resistant Soft Red Winter Wheat Varieties, Department of Agriculture, \$50,598—*Van Sanford, D.*

Analysis of Cd in Field Samples, Philip Morris Inc., \$15,000—*Wagner, G.*

Application Timing for Italian Ryegrass Control in Conventional and No-Till Wheat, Kentucky Small Grain Growers Association, \$2,500—*Martin, J., Call, D., Tutt, C.*

Commercialization of Green Note Production Technology, Kentucky Science and Technology Co. Inc., \$74,030—*Hildebrand, D.*

Cyclopropane fatty acid accumulation in plant oil, Kentucky Science and Technology Co. Inc., \$19,853—*Hildebrand, D.*

Economic and Agronomic Optimum Seeding Rates for Soybean, Kentucky Soybean Promotion Board, \$7,000—*Herbek, J., Murdock, L.*

Evaluation of Wheat Varieties for Differences in Straw Yield and Forage Potential, Kentucky Small Grain Promotion Council, \$4,800—*Bruening, W.*

Expanding Opportunities for Biomass and Hay Production in Northeastern Kentucky, Kentucky Forage and Grasslands Council, \$455,658—*Smith, S., Keene, T., Olson, G.*

eXtension: Corn and Soybean Production, University of Nebraska, \$50,000—*Lee, C.*

Function of Non-Legume Orthologs of Legume Genes Required for Nodulation and Arbuscular Mycorrhizal Symbiosis, National Science Foundation, \$320,000—*Zhu, H.*

Improving Biodiesel Production Efficiency, Kentucky Office of Energy Policy, \$85,237—*Hildebrand, D.*

Improving Goat Production in Kentucky with Forages, Kentucky Goat Producers Association, \$154,748—*Ditsch, D.*

Improving Nitrogen Application Technology under Kentucky Conditions, Kentucky Small Grain Growers Association, \$4,000—*Murdock, L., 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.*

Inhibition of Fe(III) Reduction by Nitrate: Impact of Anoxic Chemical and Biological Fe(II) Oxidation, Cooperative State Research Education and Extension, \$286,000—*Matocha, C., Coyne, M.*

In-Season Observation of Wheat Growth Status for Yield Prediction in a Farmer's Field: Continuous Change of Nitrogen Application Rate across the Landscape as an Alternative to Small Plot Research, Kentucky Small Grain Growers Association, \$4,000—*Wendroth, O., Egli, D., Murdock, L., Schwab, G.*

Kentucky Grain Crops Academy, Kentucky Small Grain Growers Association, \$35,483—*Schwab, G., Lee, C.*

Libertylink Soybean Trial Agreement, Bayer CropScience GmbH, \$3,360—*Slack, C.*

Low Soybean Populations and Weed Control, Kentucky Soybean Promotion Board, \$10,000—*Lee, C., Green, J., Herbek, J., Martin, J.*

Management of Troublesome Weeds in Highway Rights of Way, Kentucky Transportation Cabinet, \$177,286—*Witt, W.*

Managing No-Till Wheat to Optimize Harvest Index and Grain Yield, Kentucky Small Grain Promotion Council, \$2,400—*Grabau, L., Grove, J., Van Doren, S.*

Misfolded Proteins and Stress Resistance in Plants, Kentucky Science and Technology Co. Inc., \$70,286—*Smalle, J., Kurepa, J.*

Novel Approaches for Development of Soybeans with Improved Oil, Higher Oil Contents, and Enhanced Fungal Resistance, United Soybean Board, \$52,000—*Hildebrand, D.*

Soft Red Winter Wheat Breeding and Variety Development for Kentucky, Kentucky Small Grain Growers Association, \$30,000—*Van Sanford, D.*

Soil Morphology Training for On-Site Sewage Disposal Systems, Kentucky Health Services Cabinet, \$45,000—*Karathanasis, A.*

The Role of Methylation and Uridylation in MicroRNA Metabolism in Arabidopsis, University of California, \$67,002—*Tang, G.*

Uncoupling the Timing of Flowering from Stress in Plants, Kentucky Science and Technology Co. Inc., \$19,970—*Hunt, A.*

Unraveling the Catalytic Specificity of Terpene Hydroxylases and Engineering Sesquiterpene Hydroxylation into Plants, National Science Foundation, \$215,379—Chappell, J.

U.S. Wheat and Barley Scab Initiative's Networking and Facilitation Office and Web Site, Agricultural Research Service, \$202,490—Van Sanford, D.

Wheat Management on Wet Natured Soils, Kentucky Small Grain Growers Association, \$2,500—Schwab, G., Lee, C., Murdock, L.

Yield Loss Prediction Model of Soybean Rust—Development of Bastiaans Coefficients, Kentucky Soybean Promotion Board, \$24,000—Van Doren, S., Kennedy, B., Omielan, J.

Yield Loss Prediction Tool for Asian Soybean Rust—Continuation for Model Validation, Risk Management Agency, \$45,650—Van Doren, S.

Plant Pathology

Total—\$2,076,184

2007 National *Phytophthora ramorum* Early Detection Survey of Forests in Kentucky, Forest Service, \$24,000—De Sa' Guimaraes, P., Barton, C., Hartman, J.

A Genome Sequence for the Model Hemibiotroph *Colletotrichum gramimicola*, Cooperative State Research Education and Extension, \$951,260—Vaillancourt, L.

Biofumigation for Soil Health in Organic High Tunnel and Conventional Field Vegetable Production Systems, Kentucky State University, \$10,800—Vincelli, P.

Determining Distribution of a Corn Cyst Nematode in the Mid-South, University of Tennessee, \$6,000—Hershman, D.

Epidemiology and Resistance to Major Soybean Viruses in Kentucky, Kentucky Soybean Promotion Board, \$15,000—Ghabrial, S., Hershman, D., Kachroo, A.

Fatty Acid Signaling Pathway and Its Role in Plant Defense, National Science Foundation, \$153,529—Kachroo, P., Kachroo, A.

Genetic, Molecular, and Biochemical Basis of Resistance to Turnip Crinkle Virus in Arabidopsis, Boyce Thompson Institute for Plant Research, \$85,564—Kachroo, P.

Host Ammonification by Postharvest Pathogens and Its Contribution to Fungal Colonization and Symptom Development, Binational Agricultural Research and Development Fund, \$103,000—Vaillancourt, L.

Investigating the Race Structure and Population Biology of the Tobacco Black Shank Pathogen, *Phytophthora nicotianae*, North Carolina State University, \$3,700—Seebold, K.

Kentucky Continued Development of the IPM PIPE Risk Management Tool, NCSU Cooperative, North Carolina State University, \$39,598—Hershman, D., Johnson, D.

Light-Mediated Regulation of Plant Defense Signaling Defense, Kentucky Science and Technology Co. Inc., \$99,924—Kachroo, P., Kachroo, A.

Mitigating the Effects of Soybean Virus Diseases in the North Central States, Iowa State University, \$9,373—Ghabrial, S.

Predicting and Managing Tomato Spotted Wilt Virus in Tobacco, North Carolina State University, \$19,475—Seebold, K.

Rhabdovirus Phosphoproteins: RNA Silencing and Complex Formation, National Institute of Allergy and Infectious Diseases, \$68,000—Goodin, M.

Roles of Host RNA Binding Proteins in Virus Replication, National Institute of Allergy and Infectious Diseases, \$170,000—Nagy, P.

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

Southern Plant Diagnostic Network, IPM PIPE 2007, Kentucky Component, University of Florida, \$13,000—Vincelli, P.

Southern Region Plant Diagnostic Laboratory Network Kentucky Cooperating National Plant, University of Florida, \$21,903—Vincelli, P., Townsend, L.

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.

Suppression of Viral RNA Recombination by Host Genes, National Science Foundation, \$6,000—Nagy, P.

Telomere Hypervariability in the Fungus *Magnaporthe oryzae*—A Model Plant Pathogen, National Science Foundation, \$120,754—Farman, M.

Towards Developing Rust-Resistant Soybeans: Identifying Genes for Rust Resistance, University of Illinois, \$52,333—Ghabrial, S.

Uniform Trial on Integrated Management of FHB: Kentucky, Agricultural Research Service, \$10,346—Hershman, D., Lee, C.

Program and Staff Development

Total—\$91,078

Cooperative Extension Service Distance Learning and Telemedicine Program Grant, Rural Utilities Service, \$91,078—Warner, P.

Regulatory Services

Total—\$25,929

Medicated Feed Mill and BSE Rule Inspections, Food and Drug Administration, \$25,929—McMurry, S., Jaramillo, Jr., F., Thom, W.

Tracy Farmer Center for the Environment

Total—\$283,898

Community-Based Science for Teachers, Kentucky Council on Postsecondary Education, \$120,000—Hanley, C.

Exploring Elk in Eastern Kentucky, Boyle County Schools, \$28,000—Hanley, C.

Exploring Energy with Kentucky Teachers, Kentucky Office of Energy Policy, \$24,898—Hanley, C.

UK Environmental Education Council, Kentucky Department of Education, \$111,000—Hanley, C.

Veterinary Science

Total—\$651,287

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

Articular Cartilage Maturation and Repair, Morris Animal Foundation, \$35,000—MacLeod, J., Mienaltowski, M.

Development of Real-Time PCR-Based Diagnostic Assays for Detection of Virus Infections in Horses, American Quarter Horse Association, \$52,158—Balasuriya, U., Timoney, P.

EIAV Envelope Variation and Vaccine Efficacy, University of Pittsburgh, \$214,813—Issel, C.

Enhancing Interferon-Gamma in Foals, Grayson Jockey Club Research Foundation Inc., \$68,066—Horohov, D.

Horse Genomics: Linear Mapping and Microarray Development, Morris Animal Foundation, \$100,000—Bailey, E., Lear, T., MacLeod, J.

Novel Therapeutic Approaches to Treatment of Parasitic Disease and Related Clinical Conditions, Kentucky Science and Technology Co. Inc., \$150,000—Tobin, T., Howe, D.

Multi-Disciplinary Grants Led by Other Colleges*

Total—\$540,339

Construction of a Fixed-Bed Reactor for Continuous Production of Biodiesel, Kentucky Office of Energy Policy, \$58,413—Crofcheck, C.

Directed and Selective Self-Assembly of Nanosized Particles via Surface-Plasmon Excitation, National Science Foundation, \$6,000—Crofcheck, C.

On-Site Thermochemical Densification of Biomass, Kentucky Office of Energy Policy, \$133,124—Crofcheck, C.

Reducing the Explosion Potential of Ammonium Nitrate Fertilizer, National Institute for Hometown Security, \$20,000—Grove, J., Schwab, G.

Rural Health Bioterrorism and Emergency Preparedness, University of Louisville, \$31,456—Hancock, J., Henken, K., Henning, J., Husband, A., Hustedde, R., Miller, T., Newman, M., Priddy, K., Scharko, P., Vincelli, P., Welch, M.

SUPPORT: Supporting Positive Pregnancy Outcomes in Rural Towns, March of Dimes Birth Defects Foundation, \$24,680—Simmons, L.

Tat-Mediated Brain Endothelial Cell Dysfunction, National Institute of Neurological Disorders and Stroke, \$266,666—Hennig, B.

* Only College of Agriculture co-investigators are listed.

Intellectual Property

Patents Issued

Kentucky Tobacco Research and Development Center

Everett, N.P., Q. Li, C. Lawrence, and H.M. Davies. Peptides with enhanced stability to protease degradation. U.S. Patent 7,214,766. Issued May 8, 2007.

Plant and Soil Sciences

Chappell, Joseph. Plant cells and plants expressing chimeric isoprenoid synthases. U.S. Patent 7,186,891. Issued March 6, 2007.

Plant Pathology

Schardl, Christopher L. Loline alkaloid gene clusters of the fungal endophyte *Neotyphodium uncinatum*. U.S. Patent 7,183,098. Issued February 27, 2007.

Veterinary Science

Howe, Daniel. Nucleic acids encoding *Sarcocystis neurona* antigen and uses thereof. U.S. Patent 7,256,282. Issued August 14, 2007.

Genbank Register

Animal and Food Sciences

- Liao, S.F., Boling, J.A. and Matthews, J.C.
Bos taurus solute carrier family 1 member 1 (SLC1A1) mRNA, partial cds gi. Accession EF551336.
- Liao, S.F., Boling, J.A. and Matthews, J.C.
Bos taurus solute carrier family 1 member 2 (SLC1A2) mRNA, partial cds gi. Accession EF551337.
- Liao, S.F., Boling, J.A. and Matthews, J.C.
Bos taurus solute carrier family 4 (SLC1A4) mRNA, partial cds gi. Accession EF551338.
- Liao, S.F., Boling, J.A. and Matthews, J.C.
Bos taurus solute carrier family 7 member 5 (SLC1A5) mRNA, partial cds gi. Accession EF551339.
- Liao, S.F., Boling, J.A. and Matthews, J.C.
Bos taurus solute carrier family 6 (SLC7A6) mRNA, partial cds gi. Accession EU118965.

Shengfa Liao, Jim Boling, and Jamie Matthews had 16 additional accessions.

Entomology

Rieske, L.K. Accession EU304451: *Ormyrus labotus*.

Plant Pathology

- Ghabrial, S.A., P.B. de Sa, and W.M. Havens.
Characterization of a broad spectrum anti-fungal polypeptide from virus-infected *Helminthosporium (Cochliobolus) victoriae*, complete cds gi. Accession EF587239.
- Goodin, M.M. Potato yellow dwarf virus nucleocapsid protein (N) mRNA, complete cds gi. Accession EU183122.
- Goodin, M.M. Potato yellow dwarf virus phosphoprotein (P) mRNA, complete cds gi. Accession EU183123.

Veterinary Science

- Balasuriya, U.B.R. Equine arteritis virus strain F26 envelope protein (ORF2a), glycoprotein 2 (ORF2b), glycoprotein 3 (ORF3), glycoprotein 4 (ORF4), glycoprotein 5 (ORF5), unglycosylated membrane protein (ORF6), and nucleocapsid protein (ORF7) genes, complete cds. Accession EF492564.
- Balasuriya, U.B.R. Equine coronavirus, complete genome. Accession NC010327.
- Balasuriya, U.B.R. Equine arteritis virus strain F25 envelope protein (ORF2a), glycoprotein 2 (ORF2b), glycoprotein 3 (ORF3), glycoprotein 4 (ORF4), glycoprotein 5 (ORF5), unglycosylated membrane protein (ORF6), and nucleocapsid protein (ORF7) genes, complete cds. EF492563.
- Balasuriya, U.B.R. Cloning vector pEAVrVBS, complete sequence. Accession DQ846751.
- Balasuriya, U.B.R. Equine arteritis virus strain Bucyrus, complete genome. Accession DQ846750.
- Howe, D.K. Sequence 23 from patent U.S. 7256282. Accession EA275018
- Howe, D.K. Sequence 25 from patent U.S. 7256282. Accession EA275019.
- Howe, D.K. Sequence 27 from patent U.S. 7256282. Accession EA275020.
- Howe, D.K. Sequence 29 from patent U.S. 7256282. Accession EA275021.
- Mroz-Barrett, M., D. Zhang, and D.K. Howe. *Sarcocystis neurona* surface protein 1 (SPR1) mRNA, complete cds. Accession EU200939.
- Tiwari, R., A. Qin, S. Artiushin, and J.F. Timoney. *Streptococcus equi* Se18.9 gene, complete cds. Accession DQ068464.
- Verma, A., J. Hellwage, S. Artiushin, P.F. Zipfel, P. Kraicz, J.F. Timoney, and B. Stevenson. *Leptospira interrogans* serovar Pomona Na-K symporter gene, partial cds; and LenA (lenA) gene, complete cds. Accession DQ370178
- Verma, A., S. Artiushin, and J.F. Timoney. *Leptospira interrogans* serovar Pomona LruD (lruD) gene, complete cds. Accession AY803758.
- Verma, A., S. Artiushin, and J.F. Timoney. *Leptospira interrogans* serovar Pomona LruC (lruC) gene, complete cds. Accession AY803757.

U.B.R. Balasuriya had 34 additional accessions.

D.K. Howe had 11 additional accessions.

Publications

All publication dates in this section are 2007 unless otherwise noted.

Annual Report

One Hundred and Nineteenth Annual Report of the Kentucky Agricultural Experiment Station for 2006. College of Agriculture, University of Kentucky, Nancy M. Cox, Director. June.

Books and Book Chapters

Agricultural Economics

Crosta, Nicola, David Freshwater, Franco Mantino, and Karen Maguire. *OECD Rural Policy Reviews: Germany*. OECD, Paris.

Animal and Food Sciences

Cantor, A.H., E.A. Decker, and V.P. Collins. Fatty acids in poultry and egg products. IN: C.K. Chow, ed. *Fatty Acids in Foods and Their Health Implications, 3rd Edition*. Marcel Dekker, New York.

Cochran, R.C., W.K. Coblenz, and E.S. Vanzant. Animal methods for evaluating forage quality. pp. 541-552. IN: Robert F. Barnes et al., ed. *Forages: The Science of Grassland Agriculture, Volume II*. Blackwell Publishing, Ames, Iowa.

Hartnell, G.F., G.L. Cromwell, G.R. Dana, A.J. Lewis, D.H. Baker, M.R. Bedford, K.C. Klasing, F.N. Owens, and J. Wiseman. *Best Practices for the Conduct of Animal Studies to Evaluate Crops Genetically Modified for Output Traits*. International Life Sciences Institute, Washington, D.C. 194 pp.

Hennig B. Atherosclerosis: An update. pp. 218-219. IN: G.M. Wardlaw and J.S. Hampl, ed. *Perspectives in Nutrition, 7th Edition*. McGraw-Hill Companies Inc., New York.

Lindemann, M.D. Use of chromium as an animal feed supplement. Chapter 5, pp. 85-118. IN: John B. Vincent, ed. *The Nutritional Biochemistry of Chromium, III*. Elsevier Press, Amsterdam, the Netherlands.

Xiong, Y.L. Meat binding: Emulsions and batters. pp. 1-28. IN: R.W. Mandigo, ed. *Processed Meats Manual*. American Meat Science Association, Savoy, Ill.

Biosystems and Agricultural Engineering

Bucklin, R.A., S. Thompson, A. Abdel-Hadi, and M. Montross. Grain storage systems design. pp. 113-162. IN: Myer Kutz, ed. *Handbook of Farm, Dairy, and Food Machinery*. William Andrew Publishing, Norwich, N.Y.

Payne, F.A., and M. Castillo. Light backscatter sensor applications in milk coagulation. IN: Heldman, D., ed. *Encyclopedia of Agricultural, Food, and Biological Engineering*. Taylor and Francis Group, Boca Raton, Fla.

Community and Leadership Development

Hustedde, R. What's culture got to do with it?: Strategies for strengthening an entrepreneurial culture. pp. 39-58. IN: N. Walzer, ed. *Entrepreneurship and Local Economic Development*. Lexington Books, Lanham, Md.

Nah, S. Citizen reporters. IN: S. Vaughn, ed. *Encyclopedia of American Journalism*. Routledge, Oxford.

Tanaka, K., and E. Ransom. Producers, consumers, and citizens in the global agrofood system: The cases of New Zealand and South Africa in the global red meat chain. pp. 247-272. IN: W. Wright and G. Middendorf, ed. *Food Fights: Producers, Consumers, and Activists Challenge the Global Food System*. Penn State University Press Rural Studies Series, University Park, Pa.

Entomology

Dobson S.L. Transfection of *Wolbachia pipientis* into *Drosophila* embryos. IN: T. Downey, ed. *Current Protocols in Microbiology*. John Wiley and Sons Inc.

Fox, C.W., R.C. Stillwell, and J. Moya-Larano. Variation in selection and the evolution of sexual size dimorphism in two seed-feeding beetles. pp. 88-96. IN: D.J. Fairbairn, W. Blanckenhorn, and T. Székely, ed. *Sex, Size, and Gender Roles: Evolutionary Studies of Sexual Size Dimorphism*. Oxford University Press, Oxford.

Sharkey, M.J. Phylogeny and classification of Hymenoptera. pp. 521-548. IN: Z.-Q. Zhang and W.A. Shear, ed. *Linnaeus Tercentenary: Progress in Invertebrate Taxonomy*. Zootaxa 1668. Magnolia Press, Auckland, New Zealand.

Family Studies

Garman, E.T., and R.E. Forgue. *Personal Finance*. Houghton-Mifflin, Boston. 537 pp.

Mowery, R.L. The family, larger systems, and end-of-life decision making. IN: D. Balk, W. Worgrin, G. Thornton, and D. Meagher, ed. *Handbook of Thanatology: The Essential Body of Knowledge for the Study of Death, Dying, and Bereavement*. Association for Death Education and Counseling, Northbrook, Ill.

Smith, B. Contextual teaching and learning instructional strategies in family and consumer sciences. pp. 1-55. IN: C.A. Mimbs, ed. *Family and Consumer Sciences Education Association*. Central Washington University, Ellensburg, Wash.

Van de Venne, J., K. Bradford, C. Martin, M. Cox, and H. Omar. Maternal and adolescent depression related to teen smoking. pp. 149-160. IN: J. Merrick and J. Omar, ed. *Adolescent Behavior Research: International Perspectives*. Nova Science Publishers, New York.

Forestry

Lacki, M.J., J.P. Hayes, and A. Kutra, ed. *Bats in Forests: Conservation and Management*. Johns Hopkins University Press, Baltimore, Md. 329 pp.

Lacki, M.J., S.K. Amelon, and M.D. Baker. Foraging ecology of bats in forests. pp. 83-127. IN: *Bats in Forests: Conservation and Management*. Johns Hopkins University Press, Baltimore, Md.

Maehr, D.S. Views from the bear den. pp. 171-207. IN: J. Lange, ed. *The Bear Book*. Bear Trust International, Missoula, Mont.

Maehr, D.S., J.J. Cox, and J.L. Larkin. Elk (*Cervus elaphus*). pp. 526-532. IN: M. Trani-Griep, ed. *The Land Manager's Guide to Mammals of the South*. USDA Forest Service and The Nature Conservancy, Atlanta, Ga.

Horticulture

Antonious, G.F., and J.C. Snyder. Impact of soil incorporated sewage sludge on herbicide and trace metal mobility in the environment. Chapter 12, pp. 149-164. IN: T. Theophanides, ed. *Environmental Engineering and Economics*. Greece Institute for Education and Research.

Livestock Disease Diagnostic Center

Gaskill, C. Phenobarbital: Adverse effects/toxicosis. pp. 844-845. IN: E. Cote, ed. *The Veterinary Clinical Advisor*. Mosby Inc., St. Louis, Mo.

Nutrition and Food Science

Glauert, H.P. Modification of the activation of NF- κ B by vitamin E. pp. 353-364. IN: V.R. Preedy and R.R. Watson, ed. *The Encyclopedia of Vitamin E*. CABI Publishing, Oxfordshire, England.

Glauert, H.P. Vitamin E and NF- κ B activation: A review. IN: G. Litwack, ed. *Vitamin E*. Academic Press/Elsevier, San Diego, Calif. Vitamins and Hormones 76:135-153.

Plant and Soil Sciences

Bush, L.P., C.A. Roberts, and C. Schultz. Plant chemistry and antiquity components in forage. Chapter 33, pp. 509-528. IN: R.F. Barnes, C.J. Nelson, K.J. Moore, and M. Collins, ed. *Forages: The Science of Grassland Agriculture, Vol. II*. Blackwell Publishing, Ames, Iowa.

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R.D. Dinkins and G.B. Collins contributed to one publication in *Entomology*.

A.D. Karathanasis contributed to two publications in *Forestry*.

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Veterinary Science

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- Ryan, P.L., D.L. Christiansen, K. Walters, R.M. Hopper, D. Lang, B.P. Fitzgerald, D.W. Horohov, A.F. Lehner, F.C. Carmargo, and T. Tobin. Identification and role of inflammatory cytokines and ergot alkaloids on pregnancy outcome in mares exposed to endophyte-infected tall fescue. *SERA-IEG 8, Tall Fescue Toxicosis/Endophyte Workshop*, Wildersville, Tenn., Oct. 14-16.
- Scollay, M.C., W. Bernard, G.W. Brumbaugh, B.S. Carroll, N. Cohen, T. Cordes, R.M. Dwyer, R.E. Holland, D.G. Kenney, M.T. Long, P. Lunn, P. Timoney, J.L. Traub-Dargatz, J. Wilson, and W.D. Wilson. American Association of Equine Practitioners' vaccination guidelines for horses. Published online: http://www.aaep.org/vaccination_guidelines.htm.
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- Timoney, P.J. EVA in 2006. *The Horse* 24(2):28.
- Timoney, P.J. Equine viral arteritis: Significant features of a frequently misunderstood disease. pp. 221-234. IN: Proceedings, 9th Biannual Jackson Hole Veterinary Rendezvous, Jackson Hole, Wyo., June 12.
- Timoney, P.J. Equine rhinopneumonitis: Pathogenetic, clinical, and epidemiological features of a multisyndromic disease. pp. 235-242. Proceedings, 9th Biannual Jackson Hole Veterinary Rendezvous, Jackson Hole, Wyo., June 12.
- Timoney, P.J. Equine viral encephalomyelitis, part 1: West Nile encephalomyelitis. pp. 243-248. Proceedings, 9th Biannual Jackson Hole Veterinary Rendezvous, Jackson Hole, Wyo., June 12.
- Timoney, P.J. Equine viral encephalomyelitis, part 2: Eastern, Western, and Venezuelan encephalomyelitis. pp. 249-255. Proceedings, 9th Biannual Jackson Hole Veterinary Rendezvous, Jackson Hole, Wyo., June 12.
- Timoney, P.J. Equine viral arteritis: A perspective on its clinical and economic significance. pp. 115-123. Proceedings, Hagyard Bluegrass Equine Symposium, Lexington, Ky., Oct. 24-27.
- Tobin, T., W. Karpiesiuk, C. Hughes, A.F. Lehner, and F. Camargo. Synthesis of deuterated analytical standards: Ketoprofen-d3 and Flunixin-d3. pp. 214-217. IN: E. Houghton et al., ed. Proceedings, 16th International Conference of Racing Analysts and Veterinarians, Tokyo, Japan, Oct. 21-27.
- Traub-Dargatz, J., C. Heckendorf, K. Roehr, L. Creekmore, and P. Timoney. Update on equine viral arteritis (EVA). pp. 66-71. Proceedings, Colorado Veterinary Medical Association Convention, Copper Mountain, Colo., Sept. 8-12.

Graduate Degrees

Degrees listed are from the 2007 Spring Semester, 2007 Second Summer Session, and 2007 Fall Semester.

Ph.D. Dissertations

Agricultural Economics

- Babool, Md., Ashfaqul I. The impact of domestic policies on international competitiveness.
- Johnson, Rutherford B. Health information and consumer types in the domestic cracker market.
- Ona Ruales, Lucia Y. Economic impact of hospital closures in three southern states (Georgia, Tennessee, and Texas): A quasi-experimental approach.

Animal and Food Sciences

- Chen, Gong. Microbiological and physicochemical stability of red claw crayfish (*Cherax quadricarinatus*) tail meat stored with modified atmosphere packaging.
- Kim, Beob Gwyn. Influences of chromium (III) picolinate on pigs under thermal, immune, or dietary stress and on adrenal steroid secretion.
- Tseng, Yen-Chang. Influence of inulin/oligofructose on the acid-induced aggregation and gelation of soy proteins and silken tofu.
- Unger, David Edward. Population dynamics, resource selection, and landscape conservation of a recolonizing black bear population.
- Wang, Lin. Hydrolyzed potato protein as a potential antioxidant to inhibit oxidative changes in muscle protein.

Biosystems and Agricultural Engineering

- Hawes, E.A. Selective heating of nanoscale materials using near-field radiative transfer and surface plasmon resonance.
- Swamy, J.N. A polarized light scattering based technique to characterize the dynamics of liquid foams.
- Taylor, Timothy. Hydrologic and water quality characteristics of loose-dumped spoil.

Entomology

- Cooper, William R. Chestnut defenses affect generalist and specialist herbivore responses and influence community dynamics.
- Gill, Torrence A. Characterization of the Cys-motif gene family associated with *Campoletis sonorensis* *Ichnovirus* and potential usage of the Cys-motif proteins as insecticidal toxins expressed in transgenic tobacco.
- Stillwell, Roger C. The evolutionary ecology of body size and sexual size dimorphism in two seed-feeding beetles.

Family Studies

- Ashurst, Kerri. Okay, this is my life: A grounded theory study of late adolescent psychosocial experience at one interface of coping with prenatal cancer.
- Kern, Teresa T. Program availability and quality of child care in center-based programs for young children with disabilities in Kentucky: An exploration of conditions and parental perceptions.

Horticulture

- Galli, Federica. Ripening and postharvest management of pawpaw fruit.
- Nosarzewski, Marta. Sorbitol dehydrogenase expression in apple fruit.

Plant and Soil Sciences

- Hill, Kristine. Identification and characterization of proteins that interact with AGAMOUS-like 15, a MADS domain protein that preferentially accumulates in the plant embryo.
- Knott, Carrie A. Breeding for value-added traits in soft winter wheat.

Plant Pathology

- Debashish, Ghosh. Cloning, characterization, and subcellular localization of the N (nucleocapsid) and P (phosphoprotein) protein of the SYDV (potato yellow dwarf virus Sanguinolenta strain). (Joint degree with Biology)

Veterinary Science

- Camargo-Stutzman, Fernanda C. Trimetoquinol: The disposition and pharmacological actions of a highly potent equine bronchodilator.
- Murphy, Barbara A. Investigations of circadian regulation of immune-circadian interaction in the horse.
- Tiwari, Raksha. Bacteriophage SeP9 of *Streptococcus equi* and the antibacterial activity of its lysin.
- Verma, Ashutosh. Leptospiral proteins associated with equine recurrent uveitis.
- Vick, Mandy M. Obesity, inflammation, and insulin sensitivity in the horse.

M.S. Theses

Agricultural Economics

- Misra, Kaustav. Determinants of young adult poverty: A ZIP code level analysis.
- Shockley, Jordan M. A logit analysis of precision agriculture adoption in Kentucky.
- Wermuth, James A. Determining factors that contribute to nonpoint source pollution in the lower Kentucky watershed.

In addition, two non-thesis master's degrees were awarded in calendar 2007.

Animal and Food Sciences

- Cassill, Bryan D. Response of bone mineral markers to lactation, gestation, and calcium supplementation in broodmares.
- Coleman, Holly Holbrook. Focus groups on consumer attitudes on food safety educational materials in Kentucky.
- Lunsford, Andrea. Relationship of nitrogen metabolism capacity, carcass quality, and expression of glutamate transporters and metabolizing enzymes in polypay and percentage white dorper lambs.
- Pasagic, Sehrizad. Effect of processing parameters on cottage cheese yield.
- Speight, Susan. Application of carbohydrase inhibitors to modern rumen fermentation: An *in vitro* evaluation.

Biosystems and Agricultural Engineering

- Fisk, C.A. Catalytic approaches for deoxygenation of a model bio-oil.
- Luck, J.D. Effects of pervious concrete on potential environment impacts from animal production facilities.
- Pilta, Santosh. Development of an electro-mechanical system to identify soil compaction.
- Shumaker, J.L. Exploration of layered double hydroxide compounds as heterogeneous catalysts for the transesterification of several vegetable oils.

Community and Leadership Development

- Blackburn, J.J. An assessment of teacher self-efficacy and job satisfaction of early career Kentucky agriculture teachers.
- Jenkins III, C.C. A quality agricultural education program: A national Delphi study.
- In addition, five non-thesis master's degrees were awarded in calendar 2007.

Entomology

- Decker, Kimberly B. Seasonal phenology, natural enemies, and management tactics for the squash bug, *Anasa tristis* (DeGeer) on summer squash.
- George, Justine. Toxicological and behavioral effects of neonicotinoids and azadirachtin on turfgrass insects.
- Russell, Kathleen G. Effect of habitat modification and pesticide compatibility on the biological control of European corn borer, *Ostrinia nubilalis* Hübner, using *Trichogramma ostriniae* Pang et Chen in Kentucky bell peppers, *Capsicum annum L.*

Family Studies

- Bradley, Linda. Recovering from financial losses: A qualitative analysis of coping resources among hurricane survivors.
- Carlton, Erik L. Defining factors and challenge points of university-based community initiatives: An ethnographic exploration of one healthy marriage project.
- Casey, Elizabeth K. Pet ownership to weight status: A path analysis.
- Roberts, Matthew D. Emotionally focused therapy: A case study review.

Forestry

- Hall, Sarah. Topsoil seed bank of an oak/hickory forest in eastern Kentucky as a restoration tool on surface mines.
- Littlefield, Tara. Factors controlling the cycling and distribution of carbon on reclaimed minelands and regenerating clearcuts in eastern Kentucky.

Horticulture

- Poston, Amy. Cutting propagation and container production of Rudy Haag burning bush (*Euonymus alatus*) 'Rudy Haag'. (Joint degree with Plant and Soil Sciences)
- Woods, Laura. Relationship between ethylene and seed dormancy release in Echinacea species. (Joint degree with Plant and Soil Sciences)

Merchandising, Apparel and Textiles

- Huffman, Nicole. Perceptual Effects of Docents' and Costumed Interpreters' Dress on Visitor Experiences at Historic Sites.

In addition, two non-thesis master's degrees were awarded in calendar 2007.

Plant and Soil Sciences

- Carter, Sara K. Tolerance of seedling turfgrass species to ALS-inhibiting herbicides.
- Edwards, Jonathan. Birnessite reduction by Fe(II) and Fe(II)-organic complexes.
- Kovzelove, Caitlin. Carbon sequestration processes in temperate agricultural and forested soils.
- McClanahan, Linda K. Hair coat and steroidal implant effects on steers grazing endophyte-infected tall fescue during the summer.
- Whitaker, Warren. Novel corn hybrids for silage production.

Plant Pathology

- Bateman, Amy. The role of shearing in the transmission of *Diplodia pinea* in Scots pine Christmas trees in Kentucky.

Veterinary Science

- Katepalli, Madhu. Telomere length and immune function in horses.
- Smith, Kathryn L. Tracing the origin of the recent rise in neuropathogenic equine herpesvirus-1.

Graduate Enrollment and Degrees

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

	2006			2007			Net Change
	Master's	Doctorate	Total	Master's	Doctorate	Total	
Agricultural Economics	15	21	36	20	22	42	6
Animal and Food Sciences	23	16	39	26	20	46	7
Biosystems and Agricultural Engineering	23	6	29	24	5	29	0
Entomology	11	23	34	12	27	39	5
Family Studies	34	14	48	23	18	41	-7
Forestry	20	*	20	19	*	19	-1
Interior Design, Merchandising, and Textiles**	10	*	10	16	*	16	6
Nutrition and Food Science	16	*	16	16	*	16	0
Plant Pathology	2	19	21	3	21	24	3
Plant and Soil Sciences/Horticulture	23	43	66	24	45	69	3
Rural Sociology/Career, Technology and Leadership Education	29	4	33	41	15	56	23
Veterinary Science	3	19	22	4	17	21	-1
Grand Total			374			418	44

* Degree type not offered.

** Includes graduate student numbers in the joint School of Design Interior Design, Merchandising, and Textiles program.

Financial Statement

Statement of Current General Fund Income and Expenditures

Fiscal Year 2007

Income	
Federal Funds	
<i>Hatch</i>	\$4,280,427
<i>Hatch Multistate</i>	806,562
<i>McIntire-Stennis</i>	608,135
<i>Animal Health</i>	73,261
Total Federal Funds	\$5,768,385
Total State Funds	\$28,167,416
Total Funds	\$33,935,801

Expenditures	Federal	State	Total
Personal Services	\$4,383,700	\$21,681,232	\$ 26,064,932
Travel	128,004	491,840	619,844
Other Operating Expenses	684,834	5,410,479	6,095,313
Equipment	571,846	583,865	1,155,711
Total Expenditures	\$5,768,385	\$ 28,167,416	\$ 33,935,801

Staff

University of Kentucky Board of Trustees 2007

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Sandy Bugie Patterson
Erwin Roberts
C. Frank Shoop
Myra Leigh Tobin
Billy B. Wilcoxson
Joetta Y. Wickliffe

Faculty Members:

Jeffrey B. Dembo and Ernest J. Yanarella

Staff Member:

Russ Williams

Student Member:

Nick Phelps

Agricultural Experiment Station

January 1, 2007-December 31, 2007

Administration

Lee T. Todd Jr., President
Kumble R. Subbaswamy, Provost
M. Scott Smith, Dean
H.C. Owen, Treasurer (through Jan. 2, 2007)
Marc Mathews, Treasurer (after Jan. 3, 2007)
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 2007. (R) denotes Experiment Station appointment.

Agricultural Communications

Miller, T.H., Director
Wood, C.H., CALE Lab Director and Professor

Agricultural Economics

Robbins, L.W., Professor and Chair (R)
Brown, R., Lecturer (R)
Burdine, K., Extension Specialist
Debertin, D.L., Professor (R)
Dillon, C., Associate Professor (R)
Fleming, R., Associate Professor (R)
Freshwater, D., Professor (R)
Halich, G., Assistant Extension Professor
Infanger, C.L., Extension Professor
Isaacs, S., Extension Professor
Jones, L.D., Extension Professor (R)
Marchant, M.A., 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)
Reum, A.D., Assistant Extension Professor
Riggins, S.K., Extension Professor
Saghalian, S., Assistant Professor (R)
Skees, J.R., Professor (R)
Snell, W.M., Extension Professor
Trimble, R.L., 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
Boatright, W.L., Associate 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
Crist, W.L., Post-Retirement Extension Professor
Cromwell, G.L., Professor (R)
Dawson, K.A., Adjunct Professor
Edgerton, L.A., Associate Professor (R)
Eby, D.G., Professor (R)
Hamon, D.L., Professor (R)
Heusche Jr., G., Extension Professor
Hennig, B., Professor (R)
Hicks, C.L., Professor (R)
Jackson Jr., J.A., Associate Professor (R)

Johns, J.T., Post-Retirement Extension Professor
Lawrence, L.M., Professor (R)
Lindemann, M.D., Professor (R)
Matheus, J.C., Associate Professor (R)
McAllister, A.J., Extension Professor
McLeod, K.R., Assistant Professor (R)
Newman, M.C., Associate Professor (R)
O'Leary, J., Associate Extension Professor
Parker, G.R., Extension Professor
Pescatore, A.J., Extension Professor
Pierce, J.L., Adjunct Assistant Professor
Renfrow, 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, F.A., Professor (R)
Tidwell, J., Adjunct Assistant Professor
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., Associate Professor (R)
Crofcheck, C., Associate Professor (R)
Duncan, G.A., Post-Retirement Extension Professor (R)
Edwards, D.R., Professor (R)
Fehr, R., Extension Professor (R)
Gates, R.S., Professor (R)
McNeill, S.G., Associate Extension Professor (R)
Montross, M.D., Associate Professor (R)
Nokes, S.E., Professor (R)
Overhults, D.G., Associate Extension Professor (R)
Payne, F.A., 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)
Burmeister, L., Associate Professor (R)
Dyk, P., Associate Professor (R)
Garkovich, L., Professor (R)

Hains, B., Assistant Professor (R)
Harris, R., Associate Professor (R)
Horstmeier, R.P. Assistant 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)
Nall, M., 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

Obyrcki, J.J., Professor and Chair (R)
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.F., Professor (R)
Johnson, D.W., Extension Professor
Mercer, D.R., Assistant Professor (R)
Palli, S.R., Professor (R)
Potter, D.A., Professor (R)
Potter, M.F., Extension Professor
Rieske-Kinney, 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
Yeagan, K.V., 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.F., Communications Director

Family Studies

Werner-Wilson, R.J., Endowed Professor and Chair (R)
Bradford, K.P., Assistant Professor
Brock, G.W., Professor (R)
Ellington, V., Lecturer
Flashman, R.H., Extension Professor (R)
Forgue, R.E., Associate Professor (R)
Hans, J.D., Assistant Professor (R)
Heath, C.J., Professor (R)
Kim, H., Assistant 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)

Food Systems Initiative

Perry, R.R., Coordinator

Forestry

Bullard, S., Professor and Chair
Arthur, M.A., Professor (R)
Barnes, T.G., Extension Professor
Barton, C., Assistant Professor (R)
Conners, T.E., Associate Extension Professor
Cox, J.J., Adjunct Professor (R)
Cushing, T., Assistant Professor (R)
Fei, S., Assistant Professor (R)
Hill, D.H., Extension Professor
Kalisz, 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
Anderson, R.G., Extension Professor Emeritus
(R)
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)
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
Kurtunal, K., Adjunct Assistant Professor
Masabni, J.G., Assistant Extension Professor (R)
McNiel, R.E., Extension Professor Emeritus (R)
Pomper, K., Adjunct Assistant Professor
Snyder, J.C., Associate Professor (R)
Strang, J.G., Extension Professor
Williams, M.A., Assistant Professor (R)

Kentucky Tobacco Research and Development Center

Davies, H. Maelor, 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
Lee, B.D., Assistant Professor
Nieman, T.J., Professor (R)

Livestock Disease Diagnostic Center

Carter, C.N., Professor and Director (after Aug.
2007)
Bolin, D.C., Associate Professor
Bryant, U.K., Assistant Professor
Donahue, J.M., Professor
Gaskill, C.L., Associate Professor
Giles, R.C., Professor
Harrison, L.R., Professor and Director (through
Aug. 2007)
Hong, C.B., Professor
Jackson, C.B., Associate Professor
Kennedy, L.A., Assistant Professor
Poonacha, K.B., Professor
Scharko, P.B., Associate Professor
Vickers, M.L., Associate Professor
Williams, N.M., Professor

Merchandising, Apparel, and Textiles

Michelman, S.O., Associate Professor and Chair
Easter, E.P., Professor
Jackson, V.P., Associate Professor
Joshi, P.R., Lecturer
Min-Young, L., Assistant 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 Extension Professor
Addo, K., Associate Professor
Bastin, S.B., Associate Professor
Brown, D.O., Associate Professor
Chou, C.K., Professor (R)
Cook-Newell, M., Lecturer
Forsythe, H.W., Associate Professor (R)
Gaetke, L., Associate Professor
Ham, S., Associate Professor
Perry, S.D., Lecturer
Roseman, M.G., Associate Professor
Stephenson, T.J., Lecturer
Tietjen, J., Associate Extension 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
Bamhisel, R.I., Professor (R) (Emeritus)
*Baskin, C., Professor (R)
Bitzer, M.J., Professor (Emeritus)

Blair, M., Research Specialist
Bruening, W.P., Research Specialist
Burton, H.R., Associate Professor (R) (Emeritus)
Bush, L.P., Professor (R)
Calvert, J., Research Specialist
Chappell, J., Professor (R)
Clark, A.J., Research Specialist
Collins, G.B., Professor (R) (Emeritus)
Cornelius, P.L., Professor (R)
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