

*The Kentucky
Agricultural Experiment Station*

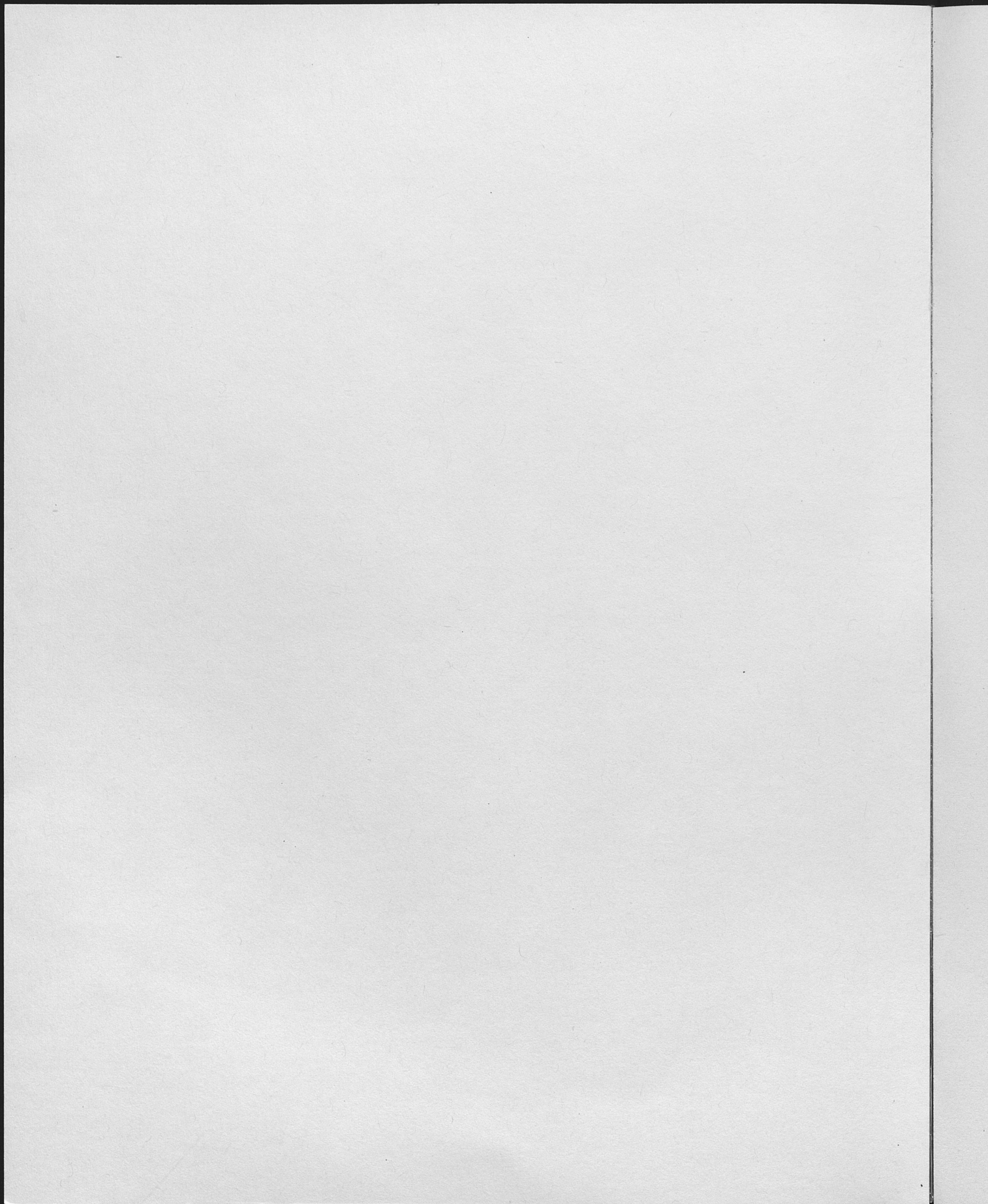
118th

Annual Report
2005

UK

UNIVERSITY OF KENTUCKY
College of Agriculture

University of Kentucky • Lexington, Kentucky 40546



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To His Excellency,
The Honorable Ernie Fletcher
Governor of Kentucky

I herewith submit the one hundred and eighteenth annual report of the Kentucky Agricultural Experiment Station for the period ending December 31, 2005. 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 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, 2006

1881

To His Excellency
The Honorable James Frazier
Governor of Kentucky

I herewith submit the one hundred and eighteenth annual report of the Kentucky Agricultural Experiment Station for the period ending December 31, 1880. This is done in accordance with an act of Congress, approved March 3, 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 Kentucky State Legislature, approved February 30, 1885, accepting the provisions of the act of Congress.

Very respectfully,
Henry M. Cox

Henry M. Cox, Associate Dean for Research
Director, Agricultural Experiment Station
Lexington, Kentucky
June 30, 1881

Purpose of the Kentucky Agricultural Experiment Station

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Statewide Research

Experiment Station Affiliated Departments and Centers

- Agricultural Economics
- Animal and Food Sciences
- Biosystems and Agricultural Engineering
- Community and Leadership Development
- Entomology
- Family Studies
- Forestry
- Horticulture
- Kentucky Tobacco Research and Development Center
- Landscape Architecture
- Livestock Disease and Diagnostic Center
- Merchandising, Apparel, and Textiles
- Nutrition and Food Science
- Plant and Soil Sciences (formerly Agronomy)
- 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

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1	Veterinary Services
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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, 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 2005. 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 2005.

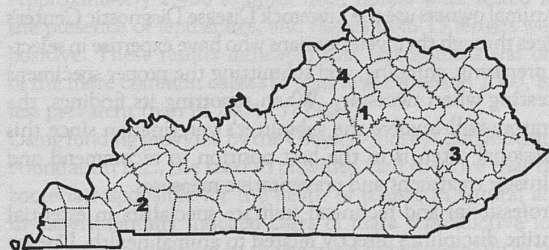
Efforts are constantly made to ensure that the research studies have application to the problems of all Kentucky farmers and other clientele groups. Locations of the experimental facilities provide conditions representative of most sections of the state.

Map Position 1

- **Campus**—Laboratories and specialized equipment for all research program areas.
- **Coldstream-Maine Chance-Spindletop Farms**—Beef and dairy cattle, poultry, horses, sheep, and swine; forages and grain crops, tobacco, and turf.
- **South 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 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, swine, fruits 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.

Livestock Disease Diagnostic Center

The Livestock Disease Diagnostic Center is charged with the diagnoses of animal diseases and performance of tests that safeguard the health of the animal population in Kentucky. The Livestock Disease Diagnostic Center helps identify infectious diseases, identifies chemical and toxic contaminants that may harm animals or humans, diagnoses nutritional diseases, identifies regulatory diseases, provides the means to meet export sales requirements, and provides an early warning system for impending epidemics.

The objective of the program is to provide veterinary diagnostic laboratory-based assistance to veterinary practitioners, farmers and agribusinesses, companion animal owners, wildlife specialists, and public programs. Also, laboratory support is provided to the animal disease control and eradication programs of the Animal Health Programs, Kentucky Department of Agriculture. An outcome of handling complex and difficult cases is consultation and continuing education for veterinarians in veterinary diagnostic medicine.

The program provides surveillance for emerging and endemic diseases such as West Nile virus (WNV) infection and for possible threats to Kentucky agribusiness such as foot and mouth disease. Also, for more than 17 years prior to the introduction of the USDA's National Surveillance Program, a stringent program to monitor for bovine spongiform encephalopathy (BSE), also known as mad cow disease, has been in place. LDDC routinely submits data as well as specimens to the USDA's National Surveillance Program.

Animal owners use the Livestock Disease Diagnostic Center's services through their veterinarians who have expertise in selecting, preparing, shipping, and submitting the proper specimens for testing when necessary. When reporting its findings, the laboratory will involve the submitter's veterinarian since this professional often is in the best position to recommend and administer treatment and preventative measures.

Professional and technical staff are specialists in essential scientific disciplines directly related to animal health. Disease diagnostic efforts are coordinated and handled by specialists in the appropriate disciplines. The Livestock Disease Diagnostic Center is organized into sections so that specialized workload/activities can be handled efficiently.

Highlights:

Faculty and staff continue to participate in the mare reproductive loss syndrome (MRLS) diagnostic and investigational efforts. The number of equine abortion accessions of all breeds are posted on a weekly basis for the winter and spring on the College of Agriculture Department of Veterinary Science Web site. This weekly posting of abortion accessions was done to help the equine industry manage concerns about the perceived long-term impact of MRLS. Identifying the cause(s) of equine abortion continues to be a major effort since the spring of 2001 when MRLS first occurred. Starting in the summer of 2001 and in cooperation with the Kentucky Department of Public Health and the Kentucky Department of Agriculture, the Livestock Disease Diagnostic Center conducted assays for statewide

surveillance and diagnosis of West Nile virus (WNV) in birds, horses, and mosquito pools. The Livestock Disease Diagnostic Center provides laboratory support for the Kentucky Department of Agriculture and the Kentucky Department of Fish and Wildlife Resources for surveillance of chronic wasting disease in the wild and farmed cervid population.

In last year's report, readers were informed that the American Association of Veterinary Laboratory Diagnosticians (AAVLD) had 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. The actions taken by the legislature will provide essential changes and enhancements that include increased floor space to perform animal necropsies, install an alkaline tissue digester to handle carcass disposal, and improve the overall laboratory biosecurity. Phase 1 does not provide the funds to upgrade the other services essential for full accreditation; therefore, additional funds, Phase 2, have been requested to meet the level of support and the implementation of new technologies to promote animal health and productivity required by Kentucky's signature equine and cattle industries. The Kentucky General Assembly will be asked to fund Phase 2 of the upgrade during the 2006 legislative session.

During 2005, concerns about the potential spread of avian influenza type H5N1 to the United States drew intense national interest. In response to the requests from the local, state, and national poultry industries, the Kentucky Poultry Federation, Breathitt Veterinary Center at Murray State University, and LDDC have put into place a statewide surveillance and testing program to monitor for the introduction of the H5N1 strain as well as strains of lesser disease potential.

A veterinary epidemiologist was hired and joined the program on February 1, 2005. A section of veterinary epidemiology is being created with the goal that real-time reporting of disease outbreaks and occurrences will be routine as soon as a complete, reliable database has been created.

Quality Assurance Program

L.L. Brown

At the recommendation of our accrediting agency, the American Association of Veterinary Laboratory Diagnosticians, a quality manager was hired July 1, 2004, to organize and implement a laboratory quality assurance program. Embarkation of this systematic method of identifying and eliminating all forms of waste in work processes while improving performance and service delivery is a new program for the Livestock Disease Diagnostic Center. The Livestock Disease Diagnostic Center Quality Program goal is based on the university mission of improving service delivery while achieving excellent human relations, sound leadership, and effective communications. The program is being designed to focus primarily on standardization of work

procedures that allow improvement of the quality of service to our internal and external customers. It is a never-ending, long-term development that is evolutionary in implementation, yet revolutionary in vision, scope, and impact.

Integral to this process will be the participation of all Livestock Disease Diagnostic Center laboratory sections in quality assurance activities such as participation in intra-laboratory proficiency testing, standardization and documentation of test procedures, strong adherence to good laboratory practices, better documentation of testing, tracking customer complaints, and improved training and competency assessment of employees. The overall program goal is to continually improve service delivery.

Public Services

Pathology

L.R. Harrison

The Livestock Disease Diagnostic Center provides services in necropsy, histopathology, and surgical biopsy. Pathologists evaluate changes found at necropsy and correlate lesions with other laboratory test results, including light microscopic examination of tissues. A comprehensive report is prepared for every case requiring the services provided by the veterinary pathologists.

Necropsy: A postmortem examination is conducted to identify any injury or change in an organ that has resulted in impairment or loss of function.

Total Necropsy Cases	5,104
Avian	160
Bovine	1,149
Bovine fetus	136
Canine and feline	361
Caprine and ovine	451
Equine	2,100
Equine fetus	644
Porcine	26
Other species (exotic—zoo, wildlife)	77

Histopathology: Tissues are prepared for light microscopic examination to reveal changes in body tissues due to disease. Tissues of 8,719 cases were processed and examined. In addition to hematoxylin and eosin (H&E) stained tissue section, special and immunochemical stains were done on 370 tissue preparations for the purpose of identifying microscopic organisms/agents that cause diseases or tissue antigens that define cell structures.

Biopsy: Small tissue specimens are prepared for light microscopic examination for evidence of neoplasia or other diseases. Tissue samples representing 4,440 cases were processed and examined. A report was generated for each case.

Cytology: Preparations of cells denuded from tumors or other type lesions, recovered from secretions, and exudates for microscopic examination. Cytopathologic examinations were done and a report generated for 482 cases.

Bacteriology/Mycology

J.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 also 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.

Highlights:

- 15,471 aerobic cultures were performed on samples submitted to the Livestock Disease Diagnostic Center; significant bacterial pathogens were found in over 50% of the samples.
- 1,203 milk samples from dairy cows were tested for microorganisms that cause mastitis; over 50% were positive for pathogenic microorganisms.
- 3,348 different bacterial isolates were tested to determine the antibiotics that could be used for their treatment in exposed animals.
- 6,269 samples from horses were cultured for contagious equine metritis organism (CEMO). All horses tested were negative for the bacterium, demonstrating that the disease no longer exists in horses in Kentucky.
- Approximately 2,400 samples from horses were tested for the presence of leptospires, and tissues from 15 fetuses were positive. These results indicated that leptospirosis was one of the more common causes of equine abortions in 2005, but less prevalent than in 2004 (37 cases).
- 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.
- In conjunction with the Molecular Biology Section, we are evaluating a PCR method for detecting *Crossiella equi* and *Amycolatopsis* spp in equine placentas. These bacteria are the primary cause of nocardioform placentitis in equine.

Molecular Diagnostics

S. Sells

The Molecular Diagnostics Section uses assays designed to detect and identify the specific nucleic acids (DNA and RNA) of pathogenic bacteria and viruses. This application takes advantage of technologies in molecular science that have been developed during the last decade. 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.

Highlights:

The section offers specific assays for over 30 pathogens and has been increasingly used to confirm the identity of isolates cultured in the Bacteriology and Virology sections of the Livestock Disease Diagnostic Center and area veterinary clinics. During 2005 testing requests for *Streptococcus equi*, equine herpesvirus, and *Lawsonia intracellularis* increased substantially. The numbers of the most requested assays include:

<i>Streptococcus equi</i>	608 (63 positive)
Equine herpesvirus	603 (61 positive)
<i>Moraxella bovis</i>	37
<i>Mycoplasma bovis</i>	74
<i>Lawsonia intracellularis</i>	198 (56 positive)
<i>Clostridium perfringens</i>	58
Equine nocardioform placentitis	1,286 (8 positive)*
<i>Neorickettsia risticii</i>	62 (12 positive)
West Nile virus	103 (2 positive birds)

* Due to *Crossiella equi*; 7 due to *Amycolatopsis* (1 of these from Florida).

Serology

B.J. Smith

The Serology Section provides accurate and timely results for both diagnostic and regulatory testing. This provides veterinarians and regulatory personnel with data upon which to base their decisions. These tests also enable Kentucky to export animals internationally. Testing for animal diseases was available utilizing various testing techniques. A total of 189,514 tests were performed.

Highlights:

Anaplasmosis	278
Avian influenza	11,255
Bovine Leukemia Virus	769
Brucellosis	9,117
Contagious equine metritis	1,346
Equine infectious anemia	54,843
Johne's disease	1,250
Leptospirosis	4,728
<i>Mycoplasma gallisepticum</i>	45,258
<i>Mycoplasma synoviae</i>	45,251
<i>Neospora caninum</i>	516
Salmonella pullorum-typhoid	14,903

Virology

M.L. Vickers

The Virology Section of the Livestock Disease Diagnostic Center provides diagnostic virology support to the laboratory pathologists, veterinarians, regulatory officials, and the Commonwealth and Federal veterinarians.

Highlights:

This section provides 55 different tests, including 33 fluorescent antibody tests to detect antigens of viruses in tissues, 14 serology tests to detect antibodies of viruses, virus isolation for cattle, horses, sheep, pigs, goats, cat, dogs, birds, reptiles, etc., as well as electron microscopy and various tests for the detection of viral antigens such as influenza. In addition, this section

maintains 10 tissue culture cell lines that are used routinely.

The section performed 27,031 tests during 2005. Of this total, 13,526 were virus neutralization serology tests completed to meet regulatory requirements.

The section has recently initiated a pilot project testing for animals coming through the stockyards carrying the bovine viral diarrhea virus. Kentucky is one of the largest producers of calves east of the Mississippi River. Removal of a source of potential disease problems would give added value to one of our most important commodities.

This is the sixth year of funding from the Kentucky Department of Public Health by the Centers for Disease Control for West Nile virus (WNV) testing. The purpose of this grant is for surveillance/monitoring of WNV in wild birds, horses, and mosquitoes. West Nile virus is transmitted by mosquitoes. Mosquito trapping was carried out by county Public Health technicians, and pools of these insects were identified and submitted to the laboratory for testing for WNV and other viruses transmitted by mosquitoes to horses and humans. Birds have been the most important sentinel species to provide information on the earliest activity of the virus in a given locality. The public was encouraged to submit dead birds to the local Public Health Department for shipment to the laboratory. Testing of birds and mosquitoes for WNV was done as a cooperative effort of this section and Molecular Diagnostics which uses the polymerase chain reaction (PCR) to test for the RNA of the viruses.

Toxicology

A.F. Lehner

The principal purpose of the toxicology department is to contribute to the long-term profitability of primary producers of food animals and animal athletes in Kentucky by supporting the practitioners of veterinary medicine across the Commonwealth. The toxicology department supports the LDDC pathologists by making it possible to identify, investigate, and quantify elements and compounds that may contribute to observed organ or tissue abnormalities that may be relevant to the differential diagnosis. The toxicology department also performs analyses of samples submitted by veterinarians, Extension agents, and private owners to assist in diagnosing problems that affect herd health initiatives.

A variety of assays were routinely performed that identify poisonous substances in tissues taken at necropsy or from various samples submitted by veterinarians. Tests performed include analysis for heavy metals (mercury, lead, arsenic, chromium, etc.) and other elements, pesticides, plant toxins, and a variety of other toxic substances (cyanide, ethylene glycol, etc.). Blood, serum, and urine from live animals are assayed for mineral/element deficiencies or excesses and toxins. These assays are performed when a potential toxicological problem exists based on animal or herd symptomologies and when a pathologist identifies changes in tissues/organs that are consistent with specific toxic agents.

Highlights:

Tests performed in the toxicology department in the past year include:

Method/Substance	Number of Analyses Performed
GC/MS analysis (instrument used to identify organic toxicants)	492
Nitrate, nitrite, oxalates, and other anions	133
ICP analysis (instrument used to identify heavy metals and other elements)	1,503
Cyanide analysis	4
Ethylene glycol analysis	14
Ionophores	6
pH	69
Total dissolved solids	2
Urea	1
Miscellaneous analyses performed either in house or other laboratories	148
Total Number of Tests	2,372

The numbers below refer to the number of toxicity cases, not the number of animals involved. On some premises, numerous animals were involved.

Substance Detected	Number of Positive Cases
Acidosis	21
Acorn poisoning	2
Elevated aflatoxin levels	1
Antifreeze poisoning	14
Arsenic poisoning	4
Buckeye toxicosis	7
Cadmium toxicosis	1
Chromium toxicosis	1
Carbofuran poisoning	10
Cherry tree toxicosis	1
Copper deficiency	42
Copper toxicity	22
Endosulfan	2
Exposure to pharmaceutical agents	2
Elevated fumonisin levels	3
Iron toxicity (equine)	2
Ivermectin toxicity (canine)	2
Kentucky coffee tree toxicity	1
Lead poisoning	3
Nitrate at dangerous levels	12
Oak toxicosis	2
Organophosphate toxicosis	1
Oxalate poisoning	1
Petroleum hydrocarbons	1
Selenium deficiency	4
Selenium toxicity	3
Strychnine	1
Sulfate toxicity	1
Taxus (Japanese yew) poisoning	3
Elevated vomitoxin (DON) levels	7
Elevated zearalenone levels	1
Total Toxicoses Detected	178

Veterinary Epidemiology

C.N. Carter

A contemporary veterinary epidemiology program located at the Livestock Disease Diagnostic Center is in the early stages of development. The primary goal of this new service is to provide animal disease surveillance and early detection of animal disease outbreaks, assist veterinarians in the investigation of serious and unusual disease problems, and conduct relevant infectious disease research. The epidemiology program will be driven by state-of-the-art electronic data gathering systems that will 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.

Highlights:

- USDA and Homeland Security grants were written and have been funded to overhaul the IT software infrastructure of the Lexington and Hopkinsville (Murray State's Breathitt Veterinary Center) laboratories and to provide seamless links to the Office of the State Veterinarian.
- Meetings occur regularly with staff at the State Veterinarian's office and the Breathitt Veterinary Center to help in planning and coordinating the flow of animal health information from the diagnostic laboratory.
- The epidemiologist is conducting epidemiological investigations on Kentucky farms and in veterinary hospitals.
- A research analyst will soon be added to the department to aid the epidemiologist in building and implementing animal health information systems and surveillance systems and to conduct research on relevant infectious disease topics.
- A Field Investigation Unit (truck outfitted with a Bowie Veterinary Unit) will soon be in service to conduct field investigations on Kentucky farms.

Regulatory Services

Our 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 is charged with administering 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 with state laws. 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.

Eleven 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 throughout the state. This reflects the Division's commitment to provide consumer protection to the purchaser of 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 of the Division, 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 perform laboratory analyses, provide computer support, process and compile reports in addition to performing various duties necessary to carry out and administer effective programs.

Auditing Program

H.S. Spencer

Audits of sales and fee payments were made on 318 of 411 feed, fertilizer, seed, and milk firms in Kentucky to verify inspection fees. Fees are assessed to help defray costs of inspecting, sampling, and analyzing commodities in accordance with state laws. Fees are indicated below. Cash receivables were substantiated on 1,080 fertilizer reports, 3,056 feed reports, 784 seed reports, and 78 milk reports. Reports were checked for accuracy and compared to field audits of the submitting firms.

The 2005 inspection fees for industries 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

The Division of Regulatory Services 2005 income from fees, licenses and testing services was as follows:

Industry	2005 Income
Feed	\$996,896
Fertilizer	\$565,027
Milk	\$191,847
Seed tags, licenses, and service testing	\$391,857
Soil service testing	\$163,297
Total	\$2,308,924

Feed Regulatory Program

S. Traylor

The feed regulatory program provides consumer protection for purchasers of livestock feed and pet food products as well as monitoring 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 industries through specific labeling requirements. Labels should identify the purpose, a guaranteed composition, ingredient list, and 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 by state and federal agencies to ensure food safety and to promote consumer confidence in the food supply. The feed program and the 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").

Highlights:

- Administered actions on 3,695 official and 225 unofficial samples of commercial feed involving 24,956 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 14 feed mills that mix restricted drugs in feed and to inspect these mills for compliance with FDA's national BSE rule. An additional 30 BSE inspections were contracted with FDA for mills not required to be licensed with FDA.
- Conducted 7,500 label reviews and maintained product registration for about 15,000 products from over 950 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.

Highlights:

- Administered actions on 3,459 official and 100 unofficial samples of fertilizer involving 10,676 chemical tests. The samples represented about 67,380 tons out of the approximately 861,600 tons of fertilizer distributed in Kentucky during 2005, or about 8%.
- Reviewed labels and registered 3,930 products from 536 firms, including 210 who manufactured custom-blended fertilizers.
- Conducted two Bulk Blend Workshops to train fertilizer blenders in proper blending techniques, use of soil tests recommendations, and environmental issues related to fertilizers.

Feed and Fertilizer Analytical Laboratory

M. Bryant

The laboratory provided analytical support for the feed, fertilizer, and soil programs. Accurate and timely analyses of these materials were provided for the official fertilizer and feed regulatory programs and for the support of agriculture in Kentucky. In 2005, the laboratory analyzed 3,960 fertilizer samples and 3,934 feed samples. In addition, 33,000 agriculture-related samples were analyzed in the spectroscopy laboratory, i.e., soil, manure, greenhouse, water, litter, and research samples. The laboratory analyzed many materials from check sample programs and special sample requests from the College of Agriculture.

Regulated fertilizer materials were analyzed for metals of concern to determine if they were adulterated based on AAPFCO guidelines. AOAC collaborative laboratory work was performed to help establish a standard method for the non-nutritive metal analyses. The laboratory staff participates as a member of the Fertilizer Metals Forum, and the laboratory staff is currently working as part of a team on digestion and measurement of these materials to develop an AOACI standard method. Laboratory investigations of materials and coordination of an inter-labora-

tory study on digestion techniques are under way. A paper on laboratory results was presented at the International AOAC and ASFFPCO meetings.

Check sample materials were analyzed from regional, national, and international programs: AOCS, AAFCO, Magruder®, mycotoxins, UAN, AFPC phosphate rock, mineral, and other sample types. We continued participation in mycotoxin and microscopy check sample programs. The laboratory routinely provides program support using approximately 75 different analytical methods. Samples are 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. The laboratory participates monthly in an inter-laboratory aflatoxin share sample program.

Software program upgrades have improved electronic data transfer to the laboratory. The new Leco TruSpec thermal analyzer was implemented for protein analysis. A project to upgrade the laboratory to provide digestion of feed materials for the analysis of Se was initiated. Studies were conducted to improve the analysis of slow-release fertilizers. A new Antek nitrogen analyzer was added to the laboratory to support the slow-release fertilizer method development. A new compound microscope was added to the laboratory to improve the feed microscopy analytical support.

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.

Highlights:

- 11 inspectors completed over 5,300 feed, fertilizer, and seed inspections of processing, manufacturing, and marketing firms in the state.
- Emphasis in the feed area included feed mill inspections for compliance with FDA's BSE regulations.
- Two inspectors visited and sampled small package specialty feed, fertilizer, and seed products in urban markets.
- Two inspectors made 256 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	3,667
Fertilizer	1,769
Seed	2,466
Milk	4,910

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 \$240 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.

Highlights:

- Reviewed and issued licenses to five transfer stations, 21 milk handlers, 21 laboratories, 63 testers, and 338 sampler-weighers.
- Analyzed and administered action on 4,710 official samples.
- Administered a monthly milk laboratory quality control check sample program through the distribution of 3,024 check samples to the 21 licensed laboratories to ensure accurate component testing procedures.
- Conducted 16 pay-record and 19 raw milk receiving manifest audits.
- Conducted 34 milk laboratory inspections.
- Collaborated with Kentucky Cabinet for Health Services Milk Safety Branch to train sampler-weighers.
- Trained and examined 42 new sampler-weighers and three new testers.
- Conducted 21 inspections of raw milk transfer stations.
- Conducted 526 sampler-weigher inspections.
- Produced and developed a new sampler-weigher and milk receiver training DVD and accompanying training materials.
- Collaborated with other College of Agriculture units and other Kentucky universities to procure a \$1.5 million Homeland Security grant to develop an electronic security system for securing bulk milk during transport.

Seed Regulatory Program

D.T. Buckingham

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

Highlights:

- Performed inspections and sampled agricultural, lawn, turf, and garden seeds at more than 600 wholesale and retail locations.
- Collected and tested 2,466 official seed samples.
- Issued stop-sale orders on 372 official seed samples and 444 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 211 agricultural permits and 40 vegetable and flower permits to label seed.
- Registered 401 seed dealers and 26 non-certified custom conditioners.
- Provided training to firms on labeling requirements, mixing procedures, and batching records.

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 2005, 99% of samples accepted into the laboratory were submitted by Kentucky firms or individuals. Improved services to customers in 2005 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 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 2005.

In addition to routine laboratory activities, the seed program hosted an educational program, the "2005 Seed School: Selling and Buying Seed of Native Species in Kentucky." The program was well attended by seed vendors, landowners, county Extension personnel, and government agency representatives.

Highlights:

Sample Type	2005 Completed Samples
Official samples	2,466
Service samples	5,245
Tobacco	1,347
Other certified crops	160
Total Samples	7,711

Service Tests Conducted

Germination	6,121
Purity	2,299
Vigor	209
Other	339
Total Service Tests	8,966

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 soils.rs.uky.edu.

The number of samples analyzed in 2005 were:

Type	Number	% Change
Agriculture	32,481	3
Home lawn and garden	6,237	-2
Commercial horticulture	792	20
Greenhouse media	64	-9
Research	8,628	-11
Atrazine residue in soil	14	-26
Animal waste	250	15
Nutrient solution	33	27
Special research solutions	1,597	81
Total	50,096	1

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/Biotechnology

Plant biotechnology is a revolutionary new 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 commercially useful proteins and for PMP applications. 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. The relatively new science of plant genomics offers the potential to enhance their production and diversity in the plant. Plants producing high yields of useful new natural products will also represent new crop and market opportunities for growers.

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 molecular farming and PMP applications;
- 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; and
- Devising new "support" technologies for PMP and molecular farming commercialization, addressing bioprocessing, harvesting, identity preservation, and regulatory compliance, etc.

KTRDC research is conducted by a team of scientists and faculty associates 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. By helping companies experience and evaluate the tobacco production strategy in this way, KTRDC researchers increase the opportunity for development of new applications for the tobacco plant.

Economic modeling of new applications for tobacco: Dr. Orlando Chambers' 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 molecular farming and plant-made pharmaceuticals (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 the vast potential of plants 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 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. He is currently exploring the gene silencing mechanisms to develop simple gene silencing technology for dissecting plant metabolic pathways.

Development of a new tobacco variety and optimized tobacco production system for PMP applications: KTRDC research conducted by Drs. David Zaitlin, Baochun Li, and Orlando Chambers 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 co-mingling with conventional tobacco ("identity preservation"). This research is conducted in close collaboration with the Plant and Soil Sciences Department at the University of Kentucky.

Facilities and Equipment

Director Dr. H. Maelor Davies is responsible for all research and services of the Center, including the KTRDC building which 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 continues to supply the research-reference cigarettes that were made for the former Tobacco and Health Research Institute. To obtain further details and to place orders, please contact Arthur Vaught by e-mail (art@uky.edu), telephone (859) 257-1657, or fax (859) 323-1077.

Tracy Farmer Center for the Environment

The Tracy Farmer Center for the Environment (TFCE) 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 Tracy Farmer Center for the Environment 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 Kentucky Wildlife Institute and 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.

Affiliated Research

Bluegrass Restoration Program: TFCE, the Kentucky Chapter of the Nature Conservancy, Kentucky State Nature Preserves Commission, and a private landowner are working toward the restoration of this globally unique Bluegrass savanna-woodland ecosystem with its famous Griffith Woods. Multidisciplinary projects include experimentation on effects of fire and grazing; development of a native plant nursery for pharmacological, agricultural, and ecological applications; restoration of a historic tavern; archaeological and historical studies; and reconstruction of Silver Lake.

Environmental Research and Training Laboratory: The Environmental Research and Training Laboratory (ERTL) provides advanced analytical instrumentation and training to UK researchers and collaborators. Included in the 4,500 square feet of laboratory space are the Geo-Sciences Facility, the Inorganic/Organic Facility, the Microbial Facility, and the Computer Facility. By providing funding to this National Science Foundation initiative, TFCE supports a central mandate of quality control and assurance that includes training researchers to obtain results that will stand up in a court of law. UK graduate students and other UK researchers adopting the relevant methods, co-workers from other Kentucky institutions, and industrial partners are eligible to use ERTL.

Kentucky Wildlife Institute: Formed by a cooperative research agreement between the Kentucky Department of Fish and Wildlife Resources and the University of Kentucky, KWI provides research supporting the stewardship of the Commonwealth's natural resources, educates and mentors current and future agency biologists, and provides technical wildlife expertise in areas that are lacking at the state agency level.

SB271 Groundwater Research Program: By working with the SB271 Groundwater Program, TFCE will support groundwater research and education efforts.

Civic Partnerships

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.

Education and Outreach

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.

Experiential Education: TFCE assists in the development of curricula and activities that allow middle-school and high-school students at Martin Luther King Jr. Academy to experience first-hand lessons that are taught in the classroom. The community-based projects depend on and emerge from the knowledge gained through experiencing education in the environment. TFCE will continue to promote experiential education through the Kentucky Natural Resources and Outdoor Recreation Academy for Minority Students, a four-week summer program with Jefferson County Public Schools.

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

Mare Reproductive Loss Syndrome Program and Conference: Students from Bates Creek High School, West Jessamine High School, and Winburn Middle School studied and participated in hands-on research in the Mare Reproductive Loss Syndrome (MRLS) Project. The program culminated in a May 12, 2005, mini-conference on the University of Kentucky campus at which the students presented their work.

Professional Development for Educators: In cooperation with a wide variety of partners, TFCE 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

TFCE Scholarships

TFCE supports university students conducting research and provides seed funding that enables federal grant submissions. This program encourages faculty participation in TFCE activities. The TFCE Scientific Advisory Board selects scholarship recipients from among the applicant pool. While students at all levels may submit applications, graduate students working on highly focused topics with defined outcomes are given priority. All selected projects require that a final report be submitted to the TFCE Scientific Advisory Board upon completion.

Units of Study Development

TFCE has assisted in the development of curriculum and units of study for formal and non-formal educators throughout the Commonwealth. Topics have included "What Is Forestry," "Outdoor Classrooms," "Energy Efficiency," "Endangered Species," and "The Living Stream."

Kentucky Agricultural Experiment Station Projects

Hatch, McIntire-Stennis, and Animal Health Projects

Hatch, McIntire-Stennis, and Animal Health projects for calendar year 2005, as reported in the USDA Current Research Information System (CRIS) database, follow.

Agricultural Economics

- Analyzing the Industrial Organization and Financial Economic Performance of the Global Agribusiness Sector—Vickner, S.S.
- 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.
- Impacts of Trade and Domestic Policies on the Competitiveness and Performance of Southern Agriculture—Marchant, M.A.
- Risk Management and Profit Potential of Alternative Production Practices, Enterprises, and Technologies—Dillon, C.
- Rural Labor Markets: Workers, Firms, and Communities in Transition—Freshwater, D.
- Technological Progress in Agriculture, Farmers, and Rural Communities—Debertin, D.L.

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.
- Detection of Estrus in Gilts and Sows—Edgerton, L.A.
- Development of Peptides to Enhance Cheese Production and Bio-Active Probes—Hicks, C.L.
- Enhancing Food Safety through Control of Food-Borne Disease Agents—Newman, M.C.
- 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—Franklin, S.T.
- Grading Up to Hair Sheep Genetics in a Low-Input Production System—Aaron, D.K.
- Inhibition of Lipid and Myoglobin Oxidation in Fresh and Value-Added Meat Products through Natural Antioxidants—Alderton, A.L.
- Interpreting Cattle Genomic Data: Biology, Applications, and Outreach—Matthews, J.C.
- Management Systems to Improve the Economic and Environmental Sustainability of Dairy Enterprises—Amaral-Phillips, D.M.
- Metabolic Relationships in Supply of Nutrients for Lactating Cows—McLeod, K.R.
- Methods to Increase Reproductive Efficiency in Cattle—Silvia, W.J.
- Modifying Milk Fat Composition for Improved Nutritional and Market Value—Franklin, S.T.
- Nitrogen Cycling, Loading, and Use Efficiency in Forage-Based Livestock Production Systems—Vanzant, E.S.
- Nutritional Modulation of the Vascular Endothelium—Hennig, B.
- Nutritional Systems for Swine to Increase Reproductive Efficiency—Lindemann, M.D.
- Proteomic Analysis of Anaerobic Bacterial Metabolism—Strobel, H.J.
- Regulation of Estrous Behavior in Dairy Cows—Silvia, W.J.
- Water Quality Issues in Poultry Production and Processing—Cantor, A.H.

Biosystems and Agricultural Engineering

- Characterization of Laboratory and Pilot Scale Foam Fractionation of Industrial Enzymes—Croftcheck, C.L.
- Demand-Controlled Ventilation (DCV) for Residential Indoor Air Quality Control—Colliver, D.G.
- Developing and Integrating Components for Commercial Greenhouse Production Systems—Norikane, J.H.
- Improvement of Thermal and Alternative Processes for Foods—Payne, F.A.
- Management of Grain Quality and Security for World Markets—Montross, M.D.
- NCR-101: Controlled Environment Technology and Use—Norikane, J.H.
- Optical Sensor Measurement of Food Composition Based on Light Scattering Distribution—Payne, F.A.
- Soil Productivity as Affected by Mechanical Influence—Wells, L.G.
- 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.
- Water and Solute Transport in Subsurface Environments—Workman, S.R.

Community and Leadership Development

- Assessing Impacts of Welfare Reform on Individual, Family, and Community Well-Being in the Rural South—Zimmerman, J.N.
- How Do Structured Out-of-School Experiences Contribute to Positive Youth Development?—Dyk, P.H.
- 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 of Arthropod Pests and Weeds—Yeagan, K.V.
- Biology and Management of Insects Attacking Turf and Woody Landscape Plants—Potter, D.A.
- Consequences of Variation in Host Plant Resistance for the Evolution of Offspring Size in a Seed-Feeding Beetle—Fox, C.W.
- Development, Evaluation, and Safety of Entomopathogens for Control of Arthropod Pests—Brown, G.C.
- Dynamic Soybean Pest Management for Evolving Agricultural Technologies and Cropping Systems—Yeagan, K.V.
- Ecology and Management of European Corn Borer and Other Stalk-Boring Lepidoptera—Brown, G.C.
- Functional Implications of Polydnavirus Genome Organization—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.
- Molecular Analysis of Pest Development and Resistance to Insecticides—Palli, S.R.
- Potential for Evolution of Resistance to Synthetic Pheromone—Haynes, K.F.
- Research and Development Leading to an Integrated Mosquito Management Program for Kentucky—Brown, G.C.
- Sources, Dispersal, and Management of Stable Flies on Grazing Beef and Dairy Cattle—Dobson, S.L.
- Systematics and Biodiversity of Biological Control Agents with Special Reference to the Braconidae—Sharkey, M.J.

Forestry

- Computer Simulation and Numerical Methods for Financial Optimization of Central Hardwood Forest Management—*Pelkki, M.H.*
- Controls on Litter Decay and N Transformations: Effects of Tree Species, Microclimate, and Soil Mesofauna in Oak and Mixed Hardwood Stands—*Arthur, M.A.*
- 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.*
- The Ecological Role of Large Mammals in the Forests of Kentucky and the Eastern United States: Implications for Conservation—*Maehr, D.S.*

Horticulture

- Botrytis cinerea* Development and Natural Volatile Compounds from Strawberry Fruit—*Kemp, T.R.*
- Environmental and Genetic Determinants of Seed Quality and Performance—*Downie, A.B.*
- Evaluation of Natural Products for Mediating Plant Resistance to Arthropods and for Use in Protecting Horticultural Crops from Insect Damage—*Snyder, J.C.*
- 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.*
- Molecular Characterization of the Role of Raffinose in the Model Plants Corn and Arabidopsis—*Downie, A.*
- Multi-State Evaluation of Wine Grape Cultivars and Clones—*Kurtural, K.*
- Multi-State Evaluation of Wine Grape Cultivars and Clones—*Archbold, D.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.*
- The Role of Ethylene and Polyamine Interaction in the Time to Radicle Protrusion during Seed Germination—*Geneve, R.L.*
- Rootstock and Interstem Effects on Pome- and Stone-Fruit Trees—*Masabni, J.G.*
- Spider Mite Resistance Mechanisms in *Lycopersicon hirsutum* Accession LA2329—*Snyder, J.*
- Technical and Economical Efficiencies of Producing, Marketing, and Managing Environmental Plants—*McNiel, R.E.*

Landscape Architecture

- A Planning Model for Assessment of Agricultural Potential in Appalachia Using Information Technology Tools—*Nieman, T.J.*

Nutrition and Food Science

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

Plant and Soil Sciences (Agronomy)

- Breeding and Genetics of Forage Crops to Improve Productivity, Quality, and Industrial Uses—*Phillips, T.D.*
- Characterizing Mass and Energy Transport at Different Scales—*Wendroth, O.O.*
- Identification and Characterization of Genes Regulated by AGL15, an Embryo-Expressed MADS-Box Gene—*Perry, S.E.*
- 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 Isoprenoid Metabolism in Plant-Pathogen Interactions—*Chappell, J.*

Plant Pathology

- Biochemistry and Genetics of Plant-Fungal Interactions—*Vaillancourt, L.*
- Biological Control of Soilborne Plant Pathogens for Sustainable Agriculture—*Hendrix, J.W.*
- Characterization of R-Gene-Mediated Signaling and Cross Talk between Defense Signaling Pathways—*Kachroo, P.*

- Epidemiology, Genetic Diversity and Strategies to Control Bean Pod Mottle Virus—*Ghabrial, S.A.*
- Genetics and Biochemistry of Alkaloid Production by Endophytes—*Schardl, C.L.*
- Genomic Studies of the Model Phytopathogenic Fungus *Magnaporthe grisea*—*Farman, M.*
- 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.*
- Role of Promoter and Enhancer Elements in the Replication of Defective Interfering Tombusvirus RNA—*Nagy, P.D.*

Veterinary Science

- Cartilage-Specific Fibronectin Isoform—*MacLeod, J.N.*
- Development of Strategies to Increase Peripheral Insulin Responsiveness in Dietary-Induced Insulin-Resistant Horses—*Fitzgerald, B.P.*
- Evaluation of Bacterial Endophytes of Grass and Legume Forages as Emerging Causes of Reproductive Loss—*Suerczek, T.W.*
- Identification and Characterization of Immunodominant Antigens from the Coccidian Parasite *Sarcocystis neurona*—*Howe, D.K.*
- 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.*
- The Effect of Aging on the Immune Response of Horses—*Horohov, D.W.*
- West Nile Virus Immunity in Horse Foals—*Chambers, T.*

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, 2005—December 31, 2005) and any budgetary addition or reduction to existing projects processed within the reporting period.

Agricultural Economics

Total—\$433,337

- Agrobiotechnology in China: Competitiveness Impacts on U.S. Soybean Export Markets, Cooperative State Research Education and Extension, \$302,000—*Marchant, M.*
SRRME: Precision Agriculture Decision Aids for Risk Reduction, Texas A&M University, \$39,976—*Dillon, C., Isaacs, S., Salim, J., Stombaugh, T.*
Sustainable Agriculture Research and Education (SARE) Professional Development Program (PDP) Plan of Work, University of Georgia, \$91,361—*Meyer, A.*

Agriculture Programs

Total—\$59,719

- How the Tobacco Buyout Is Changing the Sustainability of Kentucky Farms—and How Should Extension Programs Change to Respond?, University of Georgia, \$6,000—*Henning, J.*
Southern Region SARE Professional Development Program, University of Georgia, \$10,000—*Deaton, P.*
University of Kentucky Cooperative Extension Service Liaison, Kentucky Natural Resources Environmental Protection Cabinet, \$43,719—*Henning, J.*

Animal and Food Sciences

Total—\$4,218,535

- Continuous Health Monitoring and Lifetime Tracking of Beef Cattle, Eastern Kentucky University, \$694,923—*VanZant, E., Akers, J., Carter, C., Cox, N.*
Editor of the Journal of Nutritional Sciences, Elsevier Science Inc., \$916,863—*Hennig, B.*
Hexanal Synthesis in Isolated Soy Proteins, Cooperative State Research Education and Extension, \$198,089—*Boatright, W.*
National Beef Cattle Evaluation Consortium, Cornell University, \$50,000—*Bullock, K.*
Nutrient Utilization in the Dog, Hills Pet Nutrition Inc., \$115,000—*Harmon, D.*
Nutrition and Superfund Chemical Toxicity, National Institute of Environmental Health Sciences, \$2,162,704—*Hennig, B., Bastin, S., Gaetke, L.*
Quality Attribute Characterization of Beef Long-Term Muscles, National Cattlemen's Beef Association, \$15,956—*Alderton, A., Mikel, W., Xiong, Y.*
Shared Faculty Position with CSREES/USDA, Cooperative State Research Education and Extension, \$45,000—*Cromwell, G.*
Understanding How Chlorotetracycline Improves the Carcass Quality of Finishing Beef Cattle Project (CTC Project), Kentucky Cattlemen's Association, \$20,000—*Matthews, J., Bullock, K., McLeod, K.*

Arboretum

Total—\$20,000

- Maintaining Natural Ecosystems, Kentucky Natural Resources Environmental Protection Cabinet, \$20,000—*Farris, M.*

Associate Dean/Director

Total—\$896,351

- Forage-Animal Production Research, Department of Agriculture, \$870,589—*Cox, N., Bush, L., Dougherty, C., Fitzgerald, B., Harmon, R., Lawrence, L., Matthews, J., McDowell, K., McLeod, K., Phillips, T., Scharld, C., Tobin, T., VanZant, E., Webb, B., Witt, W.*
Support of Agricultural Research of Mutual Interest, Agricultural Research Service, \$25,762—*Cox, N.*

Biosystems and Agricultural Engineering

Total—\$3,863,610

- 2005 EnergyStar Equipment, Kentucky Natural Resources Environmental Protection Cabinet, \$20,000—*Fehr, R., Gates, R., Hash, G.*
A Cooperative Extension Program for Kentucky's Building Systems Energy Needs, Kentucky Office of Energy Policy, \$67,940—*Fehr, R., Gates, R.*
August 2005 EnergyStar State Fair Exhibit, Kentucky Natural Resources Environmental Protection Cabinet, \$25,000—*Fehr, R., Gates, R.*
Biosystems and Agriculture Engineering Training-Educational Consortium for Sustainable Plant and Animal Production Systems, Department of Education, \$61,830—*Gates, R., Montross, M.*
Cooperative Extension Radon and Indoor Air Quality Education, Kentucky Department for Public Health, \$115,000—*Piercy, L., Hash, G.*
Developing a Low-Cost Portable Vision Device for Inspecting Agricultural Products for Safety, Agricultural Research Service, \$45,600—*Gates, R.*
Development of Novel Technology for *in situ* Saccharification and Biomass Conversion, Consortium for Plant Biotechnology Research Inc., \$90,000—*Nokes, S., Strobel, H.*
Development of Robust, Automatic Calibration Algorithms for Online Detection of Diseased and Defective Poultry Carcasses, Agricultural Research Service, \$37,800—*Gates, R.*
Energy Efficiency/Renewable Energy Program Support, Kentucky Office of Energy Policy, \$48,625—*Colliver, D.*

Energy Efficiency/Renewable Energy

- Program Support, Kentucky Department of Environmental Protection, \$11,744—*Colliver, D.*
EnergyStar Energy Efficient 2005 State Fair Exhibit, Kentucky Natural Resources Environmental Protection Cabinet, \$25,000—*Fehr, R., Gates, R., Hash, G.*
Engaging KCES in Reducing Energy Use in Kentucky Agriculture, Southern States Energy Board, \$47,543—*Fehr, R., Overhults, D.*
Fabrication and Testing of a Mechanical Frame Harvesting System for Burley Tobacco, Philip Morris Inc., \$50,000—*Wells, L.*
Fabrication and Testing of a Mechanical Rail Harvesting System for Burley Tobacco, Philip Morris Inc., \$50,000—*Wells, L.*
Fabrication and Testing of a Mechanical System for Segmenting and Grading Cured Burley Tobacco, Philip Morris Inc., \$50,000—*Wells, L.*
Hometown Security: A Wireless Electronic Monitoring System for Securing Milk from Farm to Processor, Eastern Kentucky University, \$1,500,000—*Payne, F., Crist, W., Stombaugh, T., Thompson, C.*
Kentucky Lead Education and Outreach Project, University of Georgia, \$35,000—*Piercy, L., Henken, K.*
Kentucky Rural Energy Supply Program, University of Louisville, \$268,600—*Gates, R., Colliver, D., Montross, M., Nokes, S.*
KSEF: Developing a System to Reconstruct Severely Disturbed Soil, Kentucky Science and Technology Co. Inc., \$52,085—*Wells, L.*
Monitoring Ammonia Emissions, Iowa State University, \$92,121—*Gates, R., Overhults, D.*
Precision Agriculture: Precision Resource Management - Phase II, Cooperative State Research Education and Extension, \$629,672—*Stombaugh, T., Barton, C., D'Angelo, E., Egli, D., Fleming, R., Grove, J., Karathanasis, A., Kew, B., Lee, B., Maehr, D., Mueller, T., Nieman, T., Pena, E., Schwab, G., Shearer, S., Veal, M., Wendroth, O., Workman, S.*
Stream Restoration in Guy Cove, Kentucky Department of Fish and Wildlife, \$175,560—*Agouridis, C., Barton, C., Warner, R.*
Syneresis Sensor Technology Development for Curd Moisture Content Control, Cooperative State Research Education and Extension, \$350,000—*Payne, F., Castillo, M., Hicks, C.*
UK Renewable Energy Workshop and Web Page, Kentucky Natural Resources Environmental Protection Cabinet, \$9,890—*Nokes, S., Crofcheck, C., Montross, M.*
Using GPS and Spatial Technologies in Agriculture, Kentucky Department for Technical Education, \$4,600—*Stombaugh, T., Shearer, S.*

Community and Leadership Development

Total—\$723,411

- A Leadership Program to Stimulate the Entrepreneurial Culture in Tobacco-Dependent Counties of Northeast Kentucky, Kentucky Governor's Office of Agricultural Policy, \$576,986—*Hustedde, R., Jones, L.*
- Improving the UK Pre-Service Teacher Education Programs in Agriculture, Kentucky Department for Technical Education, \$7,250—*Horstmeier, R., Knight, C.*
- Is It Just Food? Geographic Differences in the Cost of Living, Mississippi State University, \$29,998—*Zimmerman, J., Ham, S.*
- Leadership Activities for Rural Youth, National FFA Organization, \$28,200—*Horstmeier, R., Nall, M.*
- Rebuilding Trust in Beef: The New Science-Based Food Safety Regime in Japan, National Science Foundation, \$72,827—*Tanaka, K., Schillo, K.*
- Refining the UK Agricultural Education Program through Faculty Professional Development, Kentucky Department for Technical Education, \$8,150—*Horstmeier, R.*

Entomology

Total—\$1,782,625

- 20 Hydroxyecdysone Suppression of Juvenile Hormone Response, National Science Foundation, \$116,890—*Palli, S.*
- Collaborative Research: Large-Scale Phylogeny of Hymenoptera, National Science Foundation, \$18,500—*Sharkey, M.*
- Cooperative Agricultural Pest Survey, Department of Agriculture, \$272,354—*Obrycki, J., Bessin, R., Dillon, P.*
- Functional Analysis of Polydnavirus and Insect Immune Cell Genes, University of Georgia, \$374,230—*Webb, B.*
- Genetic Modification of Mosquito Populations to Make Them Incapable of Transmitting Dengue Virus, University of Queensland, \$131,025—*Dobson, S.*
- KSEF R&D Excellence: Somatic Cell Expression of Dengue Virus Vectors for Gene Over-Expression and Suppression, Kentucky Science and Technology Co. Inc., \$53,981—*Webb, B.*
- Molecular Analysis of Juvenile Hormone Action, National Institute of General Medical Sciences, \$204,000—*Palli, S.*
- Monitor Gypsy Moth Populations for Slow the Spread Program, Slow the Spread Foundation, \$50,000—*Obrycki, J., Collins, J., Harper, C.*
- MorphBank: Web Image Database Technology for Comparative Morphology and Biodiversity Research, Florida State University, \$20,006—*Sharkey, M.*
- Oriental Chestnut Gall Wasp Associates in Eastern North America, Northern Nut Growers Association, \$6,503—*Rieske-Kinney, L.*
- Potential of Pest Control by Insect Immunosuppression, Binational Agricultural Research & Development Fund, \$145,000—*Webb, B.*

Progressive Investigation of Mare

- Reproduction Loss Syndrome, Kentucky Thoroughbred Owners and Breeders, \$20,000—*Webb, B., Donahue, J., Horohov, D., McDowell, K., Williams, N.*
- Recovery of Wood Vegetation Following Overstory Mortality from the Southern Pine Beetle—Phase I, Forest Service, \$42,142—*Rieske-Kinney, L.*
- Revegetation and Forest Succession of Southern Pine-Beetle Killed Shortleaf Stands in the Southern Appalachian/Cumberland Plateau Region, Forest Service, \$18,600—*Rieske-Kinney, L.*
- The Evolutionary Genetics of Sexual Size Dimorphism in a Seed-Feeding Beetle, National Science Foundation, \$6,000—*Fox, C.*
- Vector Population Modification Using Wolbachia Symbionts, National Institute of Allergy and Infectious Diseases, \$204,000—*Dobson, S.*
- Wolbachia Research Coordination Network, National Science Foundation, \$99,394—*Dobson, S.*

E-extension

Total—\$556,905

- ECOP/CSREES E-extension, University of Nebraska, \$556,905—*Wood, C., Craycraft, C.*

Family and Consumer Sciences

Total—\$2,674,165

- Cooperative Agreement with USDA/CSREES-CYFAR Technical Assistant Liaison, Cooperative State Research Education and Extension, \$39,000—*Kurzyske, J.*
- CYFERnet-Program, Cooperative State Research Education and Extension, \$180,200—*Kurzyske, J., Stivers, W.*
- Drug Endangered Child Training Network, Appalachian Regional Commission, \$362,128—*Hopper, H.*
- Future 4-H Millionaires Club, National Association of Securities Dealers, \$189,373—*Flashman, R.*
- Health Education through Extension Leadership, Cooperative State Research Education and Extension, \$809,472—*Tanner, B., Turner, L.*
- Healthy Homes in Kentucky: Focus on Mold and Home Safety, Department of Agriculture, \$4,400—*Henken, K., Adler, L.*
- Home Technology (Equipment & Utilities) Handbook, Cooperative State Research Education and Extension, \$2,500—*Badenhop, S.*
- Indoor Air for America's Homes Focusing on Kentucky Historic Buildings, Cooperative State Research Education and Extension, \$4,000—*Adler, L.*
- Kentucky Food Stamp Nutrition Program, Kentucky Families and Children Cabinet, \$1,075,092—*Sigler, P., Badenhop, S., Tanner, B.*
- Providing Healthy Homes for Kentucky Families and Children, Georgia Cooperative Extension, \$8,000—*Henken, K.*

Family Studies

Total—\$342,933

- Improve Technical Education Programs through Pre-Service Teacher Education Program in Family and Consumer Sciences, Kentucky Department for Technical Education, \$5,300—*Ellington, V.*
- Improving the UK Pre-Service Teacher Education Program in Agriculture through Faculty Professional Development, Kentucky Department for Technical Education, \$4,300—*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, \$333,333—*Hildreth, G., Bradford, K., Forgue, R., Thompson, S., Whiting, J.*

Forestry

Total—\$1,419,837

- Biotic Control of Calcium Supply: Distinguishing Sources to Regrowing Forests, State University of New York, \$19,611—*Arthur, M.*
- Black Bear Resource Selection in Eastern Kentucky, Kentucky Department of Fish and Wildlife, \$59,720—*Maehr, D.*
- Carbohydrate Response of Oak Regeneration Subjected to the Oak Shelterwood System, Forest Service, \$14,223—*Stringer, J., Dillaway, D.*
- Carbon Sequestration on Surface Mine Lands, Department of Energy, \$154,725—*Graves, D., Warner, R.*
- Cerulean Warbler and Golden Winged Warbler Status and Distribution in Kentucky, Fish and Wildlife Service, \$30,880—*Maehr, D.*
- Collaborative Research: Influences of Geology and Tree Species Composition on the Response of Forest Nutrient Dynamics to an Exotic Pest, National Science Foundation, \$37,362—*Arthur, M.*
- Colonization of Black Bear in Kentucky: Conflict and Tolerance between People and Wildlife, Kentucky Department of Fish and Wildlife, \$25,800—*Maehr, D.*
- Cooperative Cerulean Warbler Forest Management Project, University of Tennessee, \$12,000—*Maehr, D., Larkin, J.*
- Diet and Prey Abundance of the Ozark Big-Eared Bat in Northwest Arkansas, Arkansas Game and Fish Commission, \$26,000—*Lacki, M.*
- Effects of Meningeal (*Parelaphostrongylus tenuis*) Worm on Elk (*Cervus elaphus*) Survival in Southeastern Kentucky, Kentucky Department of Fish and Wildlife, \$109,000—*Maehr, D.*
- Enhancement of Disturbed Upper Coastal Plain Stream Systems: Establishing Restoration Criteria and Strategies for a Stream Mitigation Bank, Forest Service, \$168,304—*Barton, C.*
- Forestry Stewardship Public Awareness, Publicity and Training, Kentucky Natural Resources Environmental Protection Cabinet, \$10,000—*Stringer, J.*

Influence of Soil Physicochemical Properties on Hydrology in Carolina Bay Wetlands, Forest Service, \$7,257—Barton, C.

Monitoring of Best Management Practices, Kentucky Natural Resources Environmental Protection Cabinet, \$30,280—Stringer, J.

Population Estimation of Colonizing Black Bear (*Ursus americanus*) in Eastern Kentucky, Kentucky Department of Fish and Wildlife, \$45,200—Maehr, D.

Post-Mining Reforestation Demonstration Project V, Forest Service, \$490,000—Graves, D., Warner, R.

Restoration of Elk and Colonization of Black Bear in Kentucky, Kentucky Department of Fish and Wildlife, \$78,000—Maehr, D.

Status, Distribution, and Reproductive Characteristics of River Otters in Kentucky, Kentucky Department of Fish and Wildlife, \$32,975—Lacki, M.

Survey of Forest Bats in Managed Coniferous Forest of North-Central Idaho, Idaho State Department of Fish and Game, \$10,000—Baker, M., Lacki, M.

The Influence of Riparian Management Prescriptions on the Use of Upland and Riparian Habitats by Bats in Forests of the Pacific Northwest, Northwest Bat Cooperative, \$33,500—Lacki, M.

Timber Harvesting and Silvicultural Systems to Promote Forest Health in Kentucky, Kentucky Department for Natural Resources, \$25,000—Stringer, J.

4-H Central Operations

Total—\$280,962

Operation Military Kids, Auburn University, \$50,000—Stivers, W.

Positive Youth Development State and Local Collaboration Demonstration Project, Administration for Children and Families, \$220,000—Delahanty, T., Kurth, J.

Translating Air Quality Regulations for Extension Professionals, Environmental Protection Agency, \$10,962—Hanley, C.

Horticulture

Total—\$1,919,760

A Spatial Decision Support System for Expanding Viticulture in North-Central Kentucky and Southern Ohio, Cornell University, \$5,663—Kurtural, S., Strang, J.

Chloroplast-Localized N-Terminal Protein Processing by Peptide Deformylase, National Science Foundation, \$100,000—Dirk, L., Houtz, R., Williams, M.

Collaborative Research: Maintenance of a Functional Proteome through Dynamic Repair, National Science Foundation, \$289,900—Downie, A.

Development and Improvement of Grape and Wine Industry to Benefit the Agriculture Economy of Kentucky, Kentucky Department of Agriculture, \$539,750—Strang, J.

Engaging Agricultural and Non-Agricultural Students in Interdisciplinary Curriculum for Sustainable Agriculture, Cooperative State Research Education and Extension, \$141,274—Williams, M., Grabau, L., Mullen, M.

Enhancing the Native Tree Walk Web Site with Propagation Modules, Kentucky Natural Resources Environmental Protection Cabinet, \$6,200—Geneve, R., Durham, R.

KSTC R&D Voucher: Evaluation of Strawberry Growth and Yield in a Controlled Environment Growth Room, AgriGrow Technologies Inc., \$51,000—Anderson, R.

Mechanism and Significance of Post-Translational Modifications in the Large Subunit of Ribulose Biphosphate Carboxylase/Oxygenase, Energy Research, \$110,002—Houtz, R.

New Crop Opportunities, Kentucky, Phase VI, Cooperative State Research Education and Extension, \$675,971—Ingram, D., Bale, S., Crofcheck, C., D'Angelo, E., Dillon, C., Dunwell, W., Fleming, R., Geneve, R., Hartman, J., Haynes, K., Isaacs, S., Jones, R., Lacefield, E., Lee, C., McNeil, R., Montross, M., Norikane, J., Pfeiffer, T., Potter, D., Rowell, A., Schwab, G., Van Sanford, D., Williams, M.

International Programs

Total—\$454,385

Curriculum Development at the Cherkassy Institute of Management (Ukraine), Alabama A&M University, \$5,651—Reed, M.

Improving Agricultural Education in the Republic of Georgia, Foreign Agricultural Service, \$150,000—Reed, M.

Norman Borlaug International Agriculture Science Program, Department of Agriculture, \$11,462—Reed, M.

Scholarships for Thai Ministry of Agriculture Officials, Thai Ministry of Agriculture and Cooperatives, \$7,272—Reed, M.

Technical Assistance to Romanian Agriculture, Foreign Agricultural Service, \$200,000—Reed, M.

Technical Assistance to the Extension System in Serbia, Foreign Agricultural Service, \$80,000—Reed, M.

Kentucky Tobacco Research and Development Center

Total—\$867,333

Application of Plant Genomics to Alcoholic Brain Damage, Naprogenix, \$48,600—Littleton, J.

Development of Screens for Drugs in Alcohol Dependence, National Institute on Alcohol Abuse and Alcoholism, \$630,033—Littleton, J.

KSTC R&D Voucher: Application of NPG Technology to Alternate Plant Species, Naprogenix, \$88,800—Littleton, J.

Potential Anti-Relapse Drugs: A Plant Genomics Approach, Naprogenix, \$37,800—Littleton, J.

Transgenic Plant Cells as Sources of Hepatoprotective Drugs, Naprogenix, \$62,100—Littleton, J.

Landscape Architecture

Total—\$10,000

Smart Growth Land Use Planning for a Community at the Rural Urban Interface Utilizing Structured Public Involvement, Environmental Protection Agency, \$10,000—Lee, B.

Livestock Disease Diagnostic Center

Total—\$1,065,049

Animal Health and Grazing Systems, Cooperative State Research Education and Extension, \$363,913—Carter, C., Aaron, D., Bush, L., Dougherty, C., Ely, D., Harrison, L., Taylor, N., Vanzant, E., Witt, W.

Bovine Spongiform Encephalopathy (BSE) Surveillance Testing, Kentucky Department of Agriculture, \$23,036—Harrison, L.

Bovine Spongiform Encephalopathy (BSE) Testing, Kentucky Department of Agriculture, \$22,800—Harrison, L.

Development of "Chute-Side" Kits for Kentucky's Beef Quality Assurance Chute-Side Program, National Cattlemen's Beef Association, \$7,000—Scharko, P., Amaral-Phillips, D.

Diagnostic Laboratory Services for Farmers and Agribusinesses, Kentucky Department of Agriculture, \$587,000—Harrison, L.

Increase Kentucky Dairy Producers Awareness to Dairy/Beef Quality Assurance Recommendations, National Cattlemen's Beef Association, \$1,300—Scharko, P., Amaral-Phillips, D.

West Nile Surveillance of Horses and Birds, Kentucky Department for Public Health, \$60,000—Harrison, L., Vickers, M.

Merchandising, Apparel, and Textiles

Total—\$72,360

Quality Control Laboratory for NAILM, National Association of Institutional Linen Management, \$72,360—Easter, E.

Teaching Vulnerable Youth to Sew, Friends of Kentucky 4-H Incorporated, \$9,900—Miller-Spillman, K., Michelman, S.

Plant and Soil Sciences (Agronomy)

Total—\$2,737,447

26S Proteasome-Dependent Control of Cytokinin Signaling, Cooperative State Research Education and Extension, \$292,392—Smalle, J.

Accelerating the Development of FHB-Resistant Soft Red Winter Wheat Varieties, Department of Agriculture, \$56,367—Van Sanford, D.

Arabidopsis Polyadenylation Factor Subunits—Mutants and Protein Interaction Networks, National Science Foundation, \$427,000—Hunt, A.

- Assessing RNAi As a Reverse Genetic Tool for Global Analysis of NBS-LRR Gene Function in *Medicago truncatula*, Cooperative State Research Education and Extension, \$100,000—Zhu, H.
- CAREER: Microbial Population Dynamics during PCB Bioremediation in Soils, National Science Foundation, \$150,000—D'Angelo, E.
- CAREER: AGL15 during Embryogenesis, National Science Foundation, \$19,377—Perry, S.
- Mechanisms of Gene Expression by the Embryo MADS-Factor AGL15, and Roles in Glycine Max Somatic Embryogenesis, Cooperative State Research Education and Extension, \$250,000—Perry, S.
- Developing Higher Value Soybeans with Enhanced Disease Resistance, Kentucky Soybean Promotion Board, \$23,893—Hildebrand, D.
- Development of Higher Oil Soybeans, Owensboro Grain, \$20,000—Hildebrand, D.
- Development of Soybean as a Commercial Source of Epoxy Fatty Acids, United Soybean Board, \$40,000—Hildebrand, D.
- Economic and Agronomic Optimum Seeding Rates for Soybean, Kentucky Soybean Promotion Board, \$6,700—Herbek, J., Murdock Jr., L.
- Enhancing Water Quality Education in Kentucky, Texas A&M University, \$140,000—Thom, W.
- Epoxy Fatty Acid Accumulation in Seed Oil, Consortium for Plant Biotechnology Research Inc., \$109,555—Hildebrand, D.
- Epoxy Fatty Acid Accumulation in Seed Oil, Ashland Specialty Chemical Co., \$15,000—Hildebrand, D.
- Fate of 15n-Labeled Organic Nitrogen in Conventionally Managed and Organic Farming Systems, University of Georgia, \$3,500—Coyne, M.
- Indirect Benefit of No-Till Wheat: Enhanced Yield of Rotational No-Till Corn and Soybeans, Kentucky Small Grain Growers Association, \$4,000—Murdock Jr., L., Grove, J.
- Indirect Benefit of No-Till Wheat: Enhanced Yield of Rotational Corn and Soybean, Kentucky Soybean Promotion Board, \$4,000—Murdock Jr., L., Grove, J.
- Isolation and Characterization of Candidate Genes Involved in Nicotinic Biosynthesis, North Carolina State University, \$101,403—Siminszky, B.
- KSEF R&D Excellence: Development of a System for Producing Highly Purified Proteins on the Plant Surface, Kentucky Science and Technology Co. Inc., \$50,000—Wagner, G.
- KSEF R&D Excellence: Enhanced Production of Jasmonic Acid and Its Derivatives in Plant Tissues, Kentucky Science and Technology Co. Inc., \$48,733—Hildebrand, D.
- KSEF R&D Excellence: Selective Accumulation of Fatty Acids in Plant Oils, Kentucky Science and Technology Co. Inc., \$34,956—Hildebrand, D.
- KSEF R&D Excellence: Towards Understanding the Function of Rice Orthologs of Legume Genes Required for Both Nodulation and Arbuscular Mycorrhizal Symbioses, Kentucky Science and Technology Co. Inc., \$47,750—Zhu, H.
- KSTC R&D Voucher: Engineering Yeast for Terpene Production, Allylix Inc., \$2,000—Chappell, J.
- Molecular Regulation and Transport of Sterols in Plants, National Science Foundation, \$7,500—Chappell, J.
- Novel Approaches for Development of Soybeans with Improved Oil, Higher Oil Contents, and Enhanced Fungal Resistance, United Soybean Board, \$52,000—Hildebrand, D.
- Optimizing Soybean Seeding Rates for Kentucky's Major Soybean Production Regions, Kentucky Soybean Promotion Board, \$3,330—Grove, J., Lacefield, E., Lee, C.
- Physiological Basis for Yield Reduction in No-Till Wheat, Kentucky Small Grain Promotion Council, \$8,500—Van Doren, S., Grabau, L.
- Positional Cloning and Characterization of RCT1, an Anthracnose Resistance Gene in *Medicago*, Cooperative State Research Education and Extension, \$153,066—Zhu, H.
- Roundup Ready Alfalfa Established Stand Benefits, Monsanto Co., \$9,000—Slack, C.
- Seed Grant: Directed Evolution of Enzymes for the Conversion of Corn-Fiber for Biofuel Products, Kentucky Office of Energy Policy, \$35,087—Yuan, L.
- Simulations of Catastrophic Events and Associated Emergency Response Planning in Mid-America, Murray State University, \$19,868—Mueller, T.
- Soft Red Winter Wheat Breeding and Variety Development for Kentucky, Kentucky Small Grain Promotion Council, \$33,745—Van Sanford, D.
- Soil Morphology Training Course for On-Site Septic Systems, Kentucky Department for Public Health, \$45,000—Karathanasis, A.
- Soybean Genetic Engineering for Improved Vitamin E Content, Kentucky Soybean Promotion Board, \$16,000—Collins, G.
- Soybean Tissue Culture and Genetic Engineering Center, University of Georgia, \$89,534—Collins, G.
- Spatial and Temporal Development of Wheat Biomass in a Farmer's Field: Can We Predict the Spatial Grain Yield Pattern?, Kentucky Small Grain Promotion Council, \$4,000—Wendroth, O., Egli, D., Schwab, G.
- Yield Loss Prediction Tool for Field-Specific Risk Management of Asian Soybean Rust, Risk Management Agency, \$314,191—Van Doren, S., Lee, C.

Plant Pathology

Total—\$3,439,113

- Acquisition of a Laser Scanning Confocal Microscope for Plant Science Research, National Science Foundation, \$307,616—Nagy, P., Farman, M., Goodin, M., Perry, S.
- Advanced Genetic Technologies, Kentucky, Cooperative State Research Education and Extension, \$601,893—Schardl, C., Artushin, S., D'Angelo, E., Downie, B., Timoney, J.
- Development of Management Strategies to Control Major Soybean Virus Diseases in the North Central States, Iowa State University, \$25,189—Ghabrial, S.
- Fatty Acid Signaling Pathway and Its Role in Plant Defense, National Science Foundation, \$118,511—Kachroo, P., Kachroo, A.
- Fungicide Management of Soybean Rust, Agricultural Research Service, \$20,000—Hershman, D.
- Gene Expression Profiles in a Grass-Endophyte Symbiosis, Cooperative State Research Education and Extension, \$390,000—Schardl, C.
- Genome of *Epichloa festucae*, a Model Endophyte of Grasses, National Science Foundation, \$771,075—Schardl, C., Farman, M.
- Glycerolipid Metabolism and Its Role in Plant Defense, Department of Agriculture, \$50,000—Kachroo, P.
- Host Factors Involved in Viral RNA Recombination, National Institute of Allergy and Infectious Diseases, \$68,000—Nagy, P.
- Identification of Genes Involved in Anthracnose Stalk Rot Pathogenesis, E. I. DuPont De Nemours & Company, \$18,500—Vaillancourt, L.
- Incidence, Epidemiology, and Resistance to Major Virus Diseases in Soybean in Kentucky, Kentucky Soybean Promotion Board, \$10,000—Ghabrial, S., Hershman, D.
- KSEF R&D Excellence: Protein Secretion by Fungal Pathogens: Delivery into the Host Cell Cytoplasm, Kentucky Science and Technology Co. Inc., \$49,651—Farman, M., Goodin, M.
- KSEF R&D Excellence: Understanding the Molecular Mechanisms Underlying Interactions of Plants with Hemibiotrophic Pathogens, Kentucky Science and Technology Co. Inc., \$101,634—Vaillancourt, L., Kachroo, P.
- Nuclear Membrane Dynamics in Rhabdovirus-Infected Cells, Cooperative State Research Education and Extension, \$100,000—Goodin, M.
- Role of an Essential RNA Chaperone in Virus Replication, National Institute of Allergy and Infectious Diseases, \$68,000—Nagy, P.
- Sentinel Plots to Monitor the Spread of Asian Soybean Rust in the U.S. Soybean Production Regions, North Central Soybean Research Program, \$27,000—Hershman, D.
- Southern Region Plant Diagnostic Laboratory Network Kentucky Cooperating National Plant, University of Florida, \$73,500—Vincelli, P., Townsend, L.

Studies on Quadris Fungicide and Warrior Insecticide Use on Soybean in Kentucky, Kentucky Soybean Promotion Board, \$10,000—*Hershman, D., Herbek, J., Johnson, D.*

Sudden Oak Death Kentucky Forest Survey, Kentucky Department for Natural Resources, \$50,000—*Hartman, J.*

Suppression of Viral RNA Recombination by Host Genes, National Science Foundation, \$424,277—*Nagy, P.*

Toxin Biosynthesis Genes in Ergot Alkaloid-Producing Fungi, West Virginia University, \$129,000—*Schardl, C.*

Whole Genome Analysis of Pathogen-Host Recognition and Subsequent Responses in the Rice Blast Patho-System, North Carolina State University, \$25,267—*Farman, M.*

Regulatory Services

Total—\$12,619

Medicated Feed Mill and BSE Rule Inspections, Food and Drug Administration, \$12,619—*Traylor, S., Miller, C.*

Tracy Farmer Center for the Environment

Total—\$198,848

Comprehensive Commonwealth Water Education Project, University of Louisville, \$36,610—*Hanley, C.*

Kentucky University Partnership for Environmental Education, Kentucky Natural Resources Environmental Protection Cabinet, \$19,500—*Hanley, C.*

Mare Reproductive Loss Syndrome (MRLS) in Central Kentucky Schools, Fayette County Public Schools, \$17,388—*Hanley, C.*

MOA No. OSP 2006-019, Murray State University, \$7,000—*Hanley, C.*

Natural Resource Academy for Urban Youth, Kentucky Department of Fish and Wildlife, \$10,000—*Hanley, C.*

Partnership for a Green City, Kentucky Department of Environmental Protection, \$3,000—*Hanley, C.*

Solid Waste, Kentucky Department of Military Affairs, \$72,000—*Hanley, C.*

The Living Stream Units of Study, University of Louisville, \$33,350—*Hanley, C.*

Veterinary Science

Total—\$894,745

14th North American Colloquium on Animal Cytogenetics and Gene Mapping, Cooperative State Research Education and Extension, \$12,500—*Lear, T.*

EIAV Envelope Variation and Vaccine Efficacy, University of Pittsburgh, \$205,316—*Issel, C.*

Evaluation of *Sarcocystis neurona* Antigens for Development of Subunit Vaccines against Equine Protozoal Myeloencephalitis, Fort Dodge Laboratories, \$49,343—*Howe, D., Horohov, D.*

Genetic Analysis of Wild Horse and Burro Blood Samples, Bureau of Land Management, \$27,000—*Cothran, E.*

Genetic Determinants of Equine Herpesvirus-1 Neurological Disease, Grayson Jockey Club Research Foundation Inc., \$30,000—*Allen, G.*

Horse Genomics: Linear Mapping and Microarray Development, Morris Animal Foundation, \$200,000—*Bailey, E., Lear, T., MacLeod, J.*

Immune Response of Young Foals Exposed to *Rhodococcus*, Grayson Jockey Club Research Foundation Inc., \$145,382—*Horohov, D.*

In vitro and in vivo Analysis of Zylexis in Horses, Pfizer Inc., \$49,334—*Horohov, D.*

KSEF R&D Excellence: Deuterated Internal Standards for Equine Forensic Chemistry: A Regulatory Requirement Title of Proposed Project and a Developing Niche Market, Kentucky Science and Technology Co. Inc., \$98,678—*Tobin, T.*

New Tools for Detection of *Leptospira* in Horses, Grayson Jockey Club Research Foundation Inc., \$34,892—*Artushin, S.*

Production of Antibodies to Selected Equine Cytokines, Grayson Jockey Club Research Foundation Inc., \$42,300—*Horohov, D.*

Multi-Disciplinary Grants Led by Other Colleges*

Total—\$4,147,402

Acquisition of an X-Ray Diffractometer for a Shared-Use Facility Serving the University and the Region, National Science Foundation, \$289,497—*Arthur, M.A.*

Brain Endothelial Cell TNF and Tat-Induced Cell Injury, National Institute of Mental Health, \$253,400—*Hennig, B.*

KSEF R&D Excellence: Expression of Antimicrobial Peptides in Plants to Treat Human/Animal Microbial Oral Infectious Diseases, \$49,999—*Nagy, P.*

Modeling and Monitoring Brucellosis in Yellowstone Bison, National Park Service, \$20,210—*Mæhr, D.*

National Early Childhood Transition Center, Department of Education, \$1,074,627—*Hallam, R.*

New Product Development and Commercialization Center for Rural Manufacturers, Small Business Administration, \$542,654—*Maurer, R.C., Turner, L.*

Rural Health Bioterrorism and Emergency Preparedness, University of Louisville, \$491,528—*Henning, J.C., Hustedde, R.J., Nesmith, W.C., Newman, M.C., Priddy, K.T., Scharko, P.B., Vincelli, P.*

Southeast Center for Agriculture Health and Injury Prevention, Center for Disease Control and Prevention, \$36,282—*Alexander, L., Isaacs, S.G.*

Southeast Center for Agriculture Health and Injury Prevention, Center for Disease Control and Prevention, \$950,480—*Isaacs, S.G.*

State Water Resources Research Institute Grant, U.S. Geological Survey, \$92,412—*Coyne, M.S., Matocha, C.J.*

Tat-Mediated Brain Endothelial Cell Dysfunction, National Institute of Neurological Disorders and Stroke, \$286,406—*Hennig, B.*

Ultrasonic Process for Improved Biodiesel Production, Kentucky Soybean Promotion Board, \$59,907—*McNeill, S.G., Shearer, S.*

* Only College of Agriculture co-investigators are listed.

Intellectual Property

Patents Issued

Kentucky Tobacco Research and Development Center

Indu B. Maiti and co-inventor Nrisingha Dey received a patent for "Composition and Methods of Using the Mirabilis Mosaic Caulimovirus Sub-Genomic Transcript (SGT) Promotor for Plant Genetic Engineering." No. 6,930,182 August 16, 2005.

Plant and Soil Sciences (Agronomy)

Joseph Chappell (Agronomy) and co-inventors Kathleen R. Manna, Joseph P. Noel, and Courtney M. Starks received a patent for "Synthases." No. 6,890,752 May 10, 2005.

Genbank Register

Entomology

Webb, B.A. *Campoletis sonorensis* ichnovirus segment I2 vankyrin 3 mRNA, complete cds gi. ACCESSION AY953136.

Webb, B.A. *Campoletis sonorensis* ichnovirus segment I2 vankyrin 2 mRNA, complete cds gi. ACCESSION AY953135.

Webb, B.A. *Campoletis sonorensis* ichnovirus innexin Vnx-d1 gene, complete cds gi. ACCESSION AY197485.

Webb, B.A. *Campoletis sonorensis* ichnovirus segment I2 vankyrin 2 mRNA, complete cds gi. ACCESSION AY953135.

Webb, B.A. *Heliothis virescens* innexin 2 mRNA, complete cds gi. ACCESSION AY633755.

Bruce Webb had 134 additional ACCESSIONS.

Horticulture

Downie, B. *Zea mays* galactinol synthase 1 mRNA, complete cds. ACCESSION AF497507.

Downie, B. *Zea mays* galactinol synthase 2 mRNA, complete cds. ACCESSION AF497508.

Downie, B. *Zea mays* galactinol synthase 3 mRNA, complete cds. ACCESSION AF497509.

Downie, B. *Zea mays* alkaline alpha galactosidase 1 mRNA, complete cds. ACCESSION AF497510.

Downie, B. *Zea mays* alkaline alpha galactosidase 2 mRNA, complete cds. ACCESSION AF497511.

Downie, B. *Zea mays* alkaline alpha galactosidase 3 mRNA, complete cds. ACCESSION AF497512.

Downie, B. *Zea mays* alkaline alpha-galactosidase (AGA3a) gene, partial cds. ACCESSION AY705441.

Downie, B. *Zea mays* alkaline alpha-galactosidase (AGA3b) gene, partial cds. ACCESSION AY705440.

Plant and Soil Sciences (Agronomy)

Shepherd, R.W., W.T. Bass, R.L. Houtz, and G.J. Wagner. T-Phylloplanin from tobacco. Definition: *Nicotiana tabacum* phylloplanin precursor, gene, complete cds. ACCESSION No. AY705384.

Siangdung, W., Fukushige, H., and Hildebrand, D.F. *Nicotiana tabacum* fatty acid hydroperoxide lyase mRNA, complete cds. ACCESSION No. DQ129870.

Siminszky, B., L. Gavilano, S.W. Bowen, and R.E. Dewey. Definition: *Nicotiana tabacum* cytochrome P450 monooxygenase CYP82E2 mRNA, complete cds. ACCESSION No. DQ131887.

Siminszky, B., L. Gavilano, S.W. Bowen, and R.E. Dewey. Definition: *Nicotiana tabacum* cytochrome P450 monooxygenase CYP82E2 mRNA, complete cds. ACCESSION No. DQ131888.

Siminszky, B., L. Gavilano, S.W. Bowen, and R.E. Dewey. Definition: *Nicotiana tabacum* cytochrome P450 monooxygenase CYP82E4v1 mRNA, complete cds. ACCESSION No. DQ131886.

Siminszky, B., L. Gavilano, S.W. Bowen, and R.E. Dewey. Definition: *Nicotiana tabacum* cytochrome P450 monooxygenase CYP82E4v2 mRNA, complete cds. ACCESSION No. DQ131885.

Siminszky, B., L. Gavilano, S.W. Bowen, and R.E. Dewey. Definition: *Nicotiana tabacum* cytochrome P450 monooxygenase 3D_C12-15 mRNA, pseudo gene. ACCESSION No. DQ131889.

Siminszky, B., L. Gavilano, S.W. Bowen, and R.E. Dewey. Definition: *Nicotiana tabacum* cytochrome P450 monooxygenase 131A_A02 mRNA, pseudo gene. ACCESSION No. DQ131890.

Plant Pathology

Goodin, M.M. *Sonchus* yellow net virus truncated phosphoprotein gene. ACCESSION AY971951.

Schardl, C.L. The loline alkaloid biosynthesis gene clusters in fungal endophytes of grasses. ACCESSION AY7237493, AY7237503, AY7246861.

Schardl, C.L. Ergot alkaloid biosynthesis genes in ergot fungi. ACCESSION AY836771, AY836772.

Schardl, C.L. Phylogenetic analysis of *Xylella fastidiosa*, causative agent of scorch disease of shade trees and Pierce's disease of grapes. ACCESSION DQ021503-DQ021541, DQ022617-DQ022655, DQ022848-DQ022862, DQ026285-DQ026291.

Vaillancourt, L.J. Parameters affecting the efficiency of *Agrobacterium tumefaciens*-mediated transformation of *Colletotrichum graminicola*. ACCESSION DQ00536-DQ005637, DQ002814-DQ002845, DQ002847-DQ002869, DQ003083-DQ003101, DQ003103-DQ003123, DQ003125-DQ003133.

Veterinary Science

Brooks, S.A., and E. Bailey. *Equus caballus* sequences for KIT ACCESSION Nos. AY910688, AY874543, AY874542.

Gaji, R.Y., and D.K. Howe. *Sarcocystis neurona* major surface antigen 1 gene, promoter region and 5'UTR. Accession No. DQ286460.

Howe, D.K., M.R. Yeagan, D. Lindsay, B. Theising, S. Hou, and L. Fulton. *Sarcocystis falcatula* expressed sequence tags (ESTs). ACCESSION Nos. DV175471-DV181802 (6332 ESTs).

Lear, T.L. *Equus caballus* subclones MHC class I antigen pseudogenes, partial sequences. ACCESSION Nos. DQ083413-DQ083421.

Lear, T.L. *Equus caballus* subclones MHC class I antigen gene, exons 1 through 7 and partial cds. ACCESSION Nos. DQ083410, DA083412.

Lear, T.L. *Equus caballus* subclone MHC class I antigen genes, complete cds. ACCESSION Nos. DQ084307-DQ084309, DQ084311.

Lear, T.L. *Equus caballus* Ly49B mRNA for killer cell lectin-like receptor, complete cds, allele: Ly49B*003. ACCESSION No. AB120384.

Lear, T.L. *Equus caballus* 2'-5' oligoadenylate synthetase-like protein gene, promoter region and partial cds. ACCESSION No. AY577785.

Lear, T.L. *Equus caballus* 2'-5' oligoadenylate synthetase genes, promoter region and partial cds. ACCESSION Nos. AY577782, AY577784.

Lear, T.L. *Equus caballus* 2'-5' oligoadenylate synthetase 1 (Oas1) mRNA, complete cds. ACCESSION No. AY321355.

Lear, T.L. *Equus caballus* 2'-5' oligoadenylate synthetase 3 (OAS3) mRNA, complete cds. ACCESSION No. AY569128.

Lear, T.L. *Equus caballus* 2'-5' oligoadenylate synthetase-like protein (Oas1) mRNA, complete cds. ACCESSION No. AY463162.

Lear, T.L. *Equus caballus* 2'-5' oligoadenylate synthetase 2 short isoform mRNA, complete cds. ACCESSION No. AY509556.

Lear, T.L. *Equus caballus* LILRA mRNA for leukocyte immunoglobulin-like receptor, complete cds, allele: LILRA*001-002. ACCESSION Nos. AB120412, AB120413.

Lear, T.L. *Equus caballus* ILT11B mRNA for immunoglobulin-like transcript 11 protein, complete cds, allele: ILTB*. ACCESSION Nos. AB120409-AB120411.

Lear, T.L. *Equus caballus* ILT11A mRNA for immunoglobulin-like transcript 11 protein, complete cds, allele: ILT11A*. ACCESSION Nos. AB120403-AB120408.

Lear, T.L. *Equus caballus* KIR3DL mRNA for killer cell immunoglobulin-like receptor with three domains and long cytoplasmic tail, complete cds, allele: KIR3DL*. ACCESSION Nos. AB120394, AB120395.

Lear, T.L. *Equus caballus* Ly49F mRNA for killer cell lectin-like receptor, complete cds, alleles:Ly49A-F*. ACCESSION Nos. AB120377-AB120393.
MacLeod, J.N. *Equus caballus* isolate EST from articular cartilage. ACCESSION Nos. CX592098-CX606061.
Tiwari, R., A. Qin, S. Artiushin, and J.F. Timoney. *Streptococcus equi* Se18.9 gene. ACCESSION No. DQ068464.

Verma, A., S. Artiushin, and J.F. Timoney. *Leptospira interrogans* serovar Pomona Lku20 (lku20) gene. ACCESSION No. AY803758.
Verma, A., S. Artiushin, and J.F. Timoney. *Leptospira interrogans* serovar Pomona Lku57 (lku57) gene. ACCESSION No. AY803757.
Verma, A., S. Artiushin, and J.F. Timoney. *Leptospira interrogans* serovar Pomona pl13 and lruB (lruB) genes. ACCESSION No. AY741530.

Verma, A., S. Artiushin, and J.F. Timoney. *Leptospira interrogans* serovar Pomona LruA (lruA) gene. ACCESSION No. AY741529.
Wagner, C.A.R., and E. Bailey *Equus caballus* sequences for TCRB. ACCESSION Nos. AY921357-AY921406, AY927792-AY94927805.

Publications

All publication dates in this section are 2005 unless otherwise noted.

Annual Report

One Hundred and Seventeenth Annual Report of the Kentucky Agricultural Experiment Station for 2004. College of Agriculture, University of Kentucky, Nancy M. Cox, Director. June.

Books and Book Chapters

Agricultural Economics

- Casavant, Kenneth L., Craig L. Infanger, and Deborah E. Bridges. Introduction to Applied Economics, Pearson Custom Publishing, copyrighted in 1999. Published 2005. This book was restructured for the Economics 101 course at Washington State University for 2006.
- Dillon, Carl, Sayed Saghaian, Juma Salim, and Murali Kanakasabai. Optimal water storage location and management zone delineation under variable subsurface drip irrigation. pp. 959-965. IN: J.V. Stafford, ed. Precision Agriculture '05. JTI—Swedish Institute of Agricultural and Environmental Engineering. Wageningen Academic Publishers, The Netherlands.
- Salim, Juma, Carl Dillon, Sayed Saghaian, and Denis Hancock. Economic Response of site-specific management practices on alfalfa production quantity and quality. pp. 241-247. IN: S. Cox, ed. Precision Livestock Agriculture '05. JTI—Swedish Institute of Agricultural and Environmental Engineering. Wageningen Academic Publishers, The Netherlands.
- Skees, Jerry, Panos Varangis, Donald Larson, and Paul Siegel. Can financial markets be tapped to help poor people cope with weather risks? Chapter 18. IN: Stefan Dercon, ed. *Insurance Against Poverty*. University of Oxford Press, WIDER Studies in Development Economics.
- Song, Baohui, and Mary A. Marchant. China's biotech policies and their impacts on U.S. agricultural exports to China. IN: *China's Agri-Food Value Chain: Opportunities and Challenges*. Proceedings, Assessing China as a Market and Competitor WCC-101 research project; Reno, Nev., April 25-26. Conference proceedings available at URL: <http://www.china.wsu.edu/>.

Animal and Food Sciences

- Cromwell, G.L. Phosphorus nutrition of swine. pp. 607-634. IN: J.T. Sims and A.N. Sharpley, ed. Phosphorus: Agriculture and the Environment. American Society of Agronomy, Crop Science Society of America, Soil Science Society of America, Madison, Wis.
- Hennig, B., M. Toborek, P. Ramadass, G. Ludewig, and L.W. Robertson. Polychlorinated biphenyls, oxidative stress and diet. pp. 93-128. IN: Preedy and Watson, ed. Reviews in Food and Nutrition Toxicity. CRC Press, Boca Raton, Fla.
- Kristensen, N.B., G.B. Huntington, and D.L. Harmon. Splanchnic carbohydrate and energy metabolism in growing ruminants. pp. 405-432. IN: D.G. Burrin and H.J. Mersman, ed. Biology of Metabolism in Growing Animals. Biology of Growing Animals Series. Elsevier, Boston.
- Matthews, J.C., and G.L. Sipe. Patterns and putative regulatory mechanisms of high-affinity glutamate transporter expression by ruminants. pp. 263-287. Proceedings, 10th International Symposium on Ruminant Physiology, Copenhagen, Denmark.
- Newman, M.C., and S.M. Scheuren-Portocarrero. Multiple antibiotic resistance: What is the cure? pp. 201-212. IN: Biotechnology in the Feed Industry. Nottingham University Press.
- Russell, J.B., and H.J. Strobel. Microbial bioenergetics. pp. 165-186. IN: J. Dijkstra, J.M. Forbes, and J. France, ed. Quantitative aspects of ruminant digestion and metabolism, 2nd ed. CABI Publishing, Wallingford, UK.
- Thrift, F.A., and T.A. Thrift. Rationale for evaluating alternative sources of subtropically adapted beef cattle germplasm. pp. 6-15. IN: A Compilation of Research Results Involving Tropically Adapted Beef Cattle Breeds. Southern Cooperative Series Bulletin 405.
- Wang, L.L., Y.L. Xiong, and B.H. Kong. Protein-derived natural antioxidants and bioactive peptides: protecting food quality and health. pp. 409-415. IN: Lyons, T.P., and Jacques, K.A., ed. Nutritional Biotechnology in the Feed and Food Industries. Nottingham University Press, Nottingham, UK.

Biosystems and Agricultural Engineering

- Timóteo, I.F.F., and R.S. Gates. *Ambiência e construções para matrizes pesadas*. Chapter 2. IN: Manejo de Matrizes de Corte. Fundação Apnco de Ciência e Tecnologia Avícolas, Campinas, SP, Brazil.
- Warner, R.C., and C.T. Agouridis. Stream channel construction. IN: Handbook of Western Reclamation Techniques. Section II: Hydrology. U.S. Department of Interior, Office of Surface Mining. 62 pp.

Community and Leadership Development

- Harris, R. P. The impact of violence, crime and gangs in the African American community. pp. 175-190. IN: Debra A. Harley and John M. Dillard, ed. Contemporary Mental Health Issues among African Americans. American Counseling Association, Alexandria, Va.
- Hustedde, R.J., R. Shaffer, and G. Pulver. Community Economic Analysis: A How-To Manual. North Central Regional Center for Rural Development, Ames, Iowa.

Entomology

- Obyrcki, J.J., and J.D. Harwood. Alfalfa insects: Ecology and management. 3 pp. IN: D. Pimentel, ed. Encyclopedia of Pest Management. Taylor and Francis Books, Oxford, UK. Doi: 10.1081/E-EPM-120041108. Published on 28 Nov.
- Webb, B.A., N.E. Beckage, Y. Hayakawa, P.J. Krell, B. Lanzrein, M.R. Strand, D.B. Stoltz, and M.D. Summers. Polydnviridae. pp. 253-259. IN: C. Fauquet et al., ed. Virus Taxonomy. Academic Press, New York.
- Webb, B.A., and M.R. Strand. The biology and genomics of polydnviruses: Comparative physiology and biochemistry. pp. 260-323. IN: L.I. Gilbert, K. Iatrou, and S.S. Gill, ed. Comprehensive Molecular Insect Science. Vol. 5. Elsevier Press, Oxford, UK.

Family Studies

- Bradford, K. Autism and related disorders. IN: C. Elias and L. Fameyfield, ed. The Therapist's Notebook: Resources for Working with Children. Binghamton, N.Y.: The Haworth Press.
- Ganong, L., Coleman, M., and Hans, J.D. Divorce as prelude to step-family living and the consequences of re-divorce. pp. 409-434. IN: M. Fine and Harvey, ed. Handbook of Divorce and Relationship Dissolution. Mahwah, N.J.: Lawrence Erlbaum.
- Garman, E. Thomas, and Fogue, Raymond E. Personal Finance, 8th ed. Boston: Houghton-Mifflin Company.
- Hans, J. D., ed. Graduate and undergraduate study in marriage and family (2005-2007): A guide to bachelor's, master's, and doctoral programs in the United States and Canada. Lexington, Ky.: Family Scholar Publications.

Forestry

- Fei, S., P.J. Gould, K.C. Steiner, and J.C. Finley. Forest regeneration composition and development in upland, mixed-oak forests. *Tree Physiology* 25:1495-1500.
- Maehr, D.S. Can the Florida panther provide insight into restoring the eastern cougar? pp. 169-177. IN: C. Bolgiano and J. Roberts, ed. The Eastern Cougar: Historic Accounts, Scientific Investigations, New Evidence. Stackpole Books, Mechanicsburg, Pa.

Maehr, D.S., M.A. Orlando, and J.J. Cox. Large carnivores, herbivores, and omnivores in South Florida: An evolutionary approach to conserving landscapes and biodiversity. pp. 293-314. IN: J. Ray, J. Berger, and K. Redford, ed. *Large Carnivores and the Conservation of Biodiversity*. Island Press, Washington, D.C.

Horticulture

Geneve, R.L. Vigor testing in flower seeds. pp. 311-332. IN: M.B. McDonald and F. Kwong, ed. *Flower Seeds: Biology and Technology*. CAB International, London.

Merchandising, Apparel, and Textiles

Damhorst, M.L., Miller-Spillman, K., and Michelman, S. *Meanings of Dress*, 2nd ed. New York: Fairchild Publications.

Michelman, S.O. Clothing: Clothing and religion in the West. pp. 1831-1834. IN: Lindsay Jones, ed. *Encyclopedia of Religion*. Vol. 3, 2nd ed. Detroit: Macmillan Reference USA.

Michelman, S.O. Reveal or conceal: Examining the meaning of modesty in postmodern America. pp. 210-216. IN: M. Damhorst, K. Miller-Spillman, and S. Michelman, ed. *Meanings of Dress*, 2nd ed. New York: Fairchild Publications.

Michelman, S.O. From habit to fashion: Dress of Catholic women religious. pp. 483-489. IN: M. Damhorst, K. Miller-Spillman, and S. Michelman, ed. *Meanings of Dress*. New York: Fairchild Publications.

Michelman, S.O. Is thin in? Kalabari culture and the meaning of fatness. pp. 63-66. IN: M. Damhorst, K. Miller-Spillman, and S. Michelman, ed. *Meanings of Dress*. New York: Fairchild Publications.

Spillman, K. Playing dress-up: Childhood memories of dress. pp. 274-283. IN: M. Damhorst, K. Miller-Spillman, and S. Michelman, ed. *Meanings of Dress*. New York: Fairchild Publications.

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Baskin, C.C., and J.M. Baskin. Seed dormancy in wild flowers. pp. 163-185. IN: M.B. McDonald and F. Kwong, ed. *Flower Seeds: Biology and Technology*. CAB International, Wallingford, UK.

Coyne, M.S., and J.A. Thompson. *Fundamental Soil Science*. 403 pp. Delmar Publishers Inc., Clifton Park, N.Y. (ISBN:0-7668-4268-1).

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Hildebrand, D., and L. Mamadou. Genetically engineered oils. IN: C. Akoh and O.M. Lai, ed. *Healthful Lipids*. AOCS Press, Champaign, Ill.

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Matocha, C.J., K.G. Scheckel, and D.L. Sparks. Kinetics and mechanisms of soil biogeochemical processes. Chapter 6, pp. 309-342. IN: D.L. Sparks and M.A. Tabatabai, ed. *Chemical Processes in Soils*. SSSA Book Series, No. 8, Madison, Wis.

Plant Pathology

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Ghabrial, S.A., D. Jiang, and J.R. Castón. Chrysoviridae. pp. 591-595. IN: C.M. Fauquet, M.A. Mayo, J. Maniloff, U. Desselberger, and L.A. Ball, ed. *Virus Taxonomy*, 8th Report of the International Committee on Taxonomy of Viruses. Elsevier/Academic Press, London.

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Timoney, J.F. Streptococcal infections. pp. 75-81. IN: A.J. Higgins and J.R. Snyder, ed. *The Equine Manual*, 2nd ed. Saunders/Elsevier.

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PR-507: *2004 Orchardgrass Report*. G.L. Olson, T.D. Phillips, G.D. Lacefield, D.C. Ditsch, and S.R. Smith.

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PR-517: *2005 Small Grain Variety Performance Tests*. B. Bruening, C. Tutt, C.S. Swanson, J. Connelley, C. Knott, and D. Van Sanford.

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PR-519: *2005 Kentucky Soybean Performance Tests*. E. Lacefield, R. Rhodes, and T. Pfeiffer.

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Kwaku Addo contributed to two publications with the primary author in the Animal and Food Sciences Department.

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Andy Bailey contributed to two other publications in *Agricultural Economics*. Lowell Bush contributed to one other publication in *Plant Pathology*. Thomas Mueller contributed to two other publications in *Biosystems and Agricultural Engineering*. David Williams contributed to seven other publications in *Plant Pathology* and to one publication in *Biosystems and Agricultural Engineering*. Mark Coyne contributed to one publication in *Biosystems and Agricultural Engineering*.

In addition, members of the department published 109 abstracts.

Plant Pathology

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Donald Hershman also contributed to one publication listed under another department.
Christopher Schardl also contributed to one publication listed under another department.
Paul Vincelli also contributed to one publication listed under another department.

In addition, members of the department published 30 abstracts.

Veterinary Science

- Anzai, T., Kuwanmoto, R. Wada, S. Sugita, T. Kakuda, S. Takai, T. Higuchi, and J.F. Timoney. Variation in the N-terminal region of an M-like protein of *Streptococcus equi* and evaluation of its potential as a tool in epidemiologic studies. *American Journal of Veterinary Research* 66:2167-2171.
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- Dirikolu, L., W. Karpiesiuk, A.F. Lehner, C. Hughes, W.E. Woods, J.D. Harkins, J. Boyles, A. Atkinson, D.E. Granstrom, and T. Tobin. New therapeutic approaches for equine protozoal myeloencephalitis: Synthesis and pharmacokinetics of diclazuril sodium salt in the horse. pp. 135-139. Proceedings, 15th International Conference of Racing Analysts and Veterinarians, Dubai, UAE.
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- Horohov, D.W. Immunology and immunopathology of the equine lung. Mucosal Immunology Conference Proceedings, The Ohio State University, Columbus, Ohio.
- Horohov, D.W., C.C. Breathnach, and T. Sturgill-Wright. Development of immunological function in the foal and how it relates to *Rhodococcus equi*. Haygard Bluegrass Equine Symposium 2005 Proceedings, Haygard-Davidson-McGhee, Lexington, Ky.
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- Hughes, C.G., A.F. Lehner, W. Karpiesiuk, F.C. Camargo, J.D. Harkins, W.E. Woods, J. Bosken, J. Boyles, A. Troppmann, and T. Tobin. Preliminary report on the confirmation and quantitative determination of salmeterol in equine urine. pp. 406-411. Proceedings, 15th International Conference of Racing Analysts and Veterinarians, Dubai, UAE.
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- Karpiesiuk, W., A.F. Lehner, and T. Tobin. Synthesis and certification of salmeterol and salmeterol-d standards. p. 405. Proceedings, 15th International Conference of Racing Analysts and Veterinarians, Dubai, UAE.
- Karpiesiuk, W., A.F. Lehner, C. Hughes, F. Guan, C. Uboh, L. Soma, C. Bratton, L. Kellerman, and T. Tobin. Preparation and analysis of tetrahydrogestrinone (THG), a recently reported "designer" anabolic steroid: A preliminary report. pp. 518-522. Proceedings, 15th International Conference of Racing Analysts and Veterinarians, Dubai, UAE.

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- Lehner, A.F., C.G. Hughes, W. Karpiesiuk, J.D. Harkins, J. Bosken, F. Camargo, B.J. Boyles, A. Troppmann, W.E. Woods, and T. Tobin. Metabolism of the alpha-2-agonist amitraz in horses and confirmation of its administration. pp. 155-160. Proceedings, 15th International Conference of Racing Analysts and Veterinarians, Dubai, UAE.
- MacLeod, J.N. A broad perspective on chondrocyte gene expression. Equine Disease Quarterly, 14(1):3-4.
- Powell, D.G. Commentary. Equine Disease Quarterly 14(1):1.
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- Timoney, P.J. Equine viral arteritis: Is the disease a cause for industry concern? Parts I and II. Impulsion, Spring, pp. 4-7; Summer, pp. 9-10.
- Timoney, P.J. Equine herpesviruses 1 and 4: Economically significant pathogens of the horse. pp. 9-15. 17th International Seminar: Some Important Viral Disease of Horses, Perugia, Italy, May 2.
- Timoney, P.J. Equine viral arteritis: Significant features of a frequently misunderstood disease. pp. 17-24. 17th International Seminar: Some Important Viral Disease of Horses, Perugia, Italy, May 2.
- Timoney, P.J. West Nile virus: The North American experience. pp. 25-33. 17th International Seminar: Some Important Viral Disease of Horses, Perugia, Italy, May 2.
- Timoney, P.J. Perspective on the virologic, epidemiologic, and prophylactic aspects of equine influenza. pp. 35-36. 17th International Seminar: Some Important Viral Disease of Horses, Perugia, Italy, May 2.
- Timoney, P.J. Equine viral arteritis: How significant a threat to the horse? pp. 238-242. Proceedings, 15th International Conference of Racing Analysts and Veterinarians, Dubai, UAE.
- Tobin, T., J.D. Harkins, J.F. Roberts, P.W. Van Meter, and T.A. Fuller. Septic penetrating setae/ bacteria/bacterial emboli/septic penetrating setal emboli: A hypothesis to explain the pathogenesis of the mare reproductive loss syndrome. pp. 418-422. Proceedings, 15th International Conference of Racing Analysts and Veterinarians, Dubai, UAE.

Graduate Degrees

Degrees listed are from the 2005 Spring Semester, 2005 Second Summer Session, and 2005 Fall Semester.

Ph.D. Dissertations

Agricultural Economics

- Chen, Jianhua. Neural Network Applications in Agricultural Economics.
- Gandonou, Jean-Marc. Essays on Precision Agriculture Technology Adoption and Risk Management.
- Hao, Jianqiang. Modeling and Financing Weather Risk: Three Essays.
- Veeramani, Venkat N. Testing for the Existence of Price Points and Price Thresholds in Retail Scanner Data Using Microeconomic Theory.
- Xiao, Qing. Three Essays in International Economics.

Animal and Food Sciences

- Agudelo-Trujillo, Jorge Hernan. An Examination of Dietary Amendments to Affect Phosphorus Utilization in Growing Pigs.
- Ao, Tuoying. Exogenous Enzymes and Organic Acids in the Nutrition of Broiler Chicks: Effects on Growth Performance and *in vitro* and *in vivo* Digestion.
- Elgaali, Hesham Abd-Abrahim. The Minimum Inhibitory Concentration and Mode of Action of Decanol against *Listeria monocytogenes* and Its Antilisterial Effects in Ready-to-Eat Meat Products.
- Zanghi, Brian M. The *in vivo* and *in vitro* Characterization and Regulation of Canine Peptide Transporter 1.

Biosystems and Agricultural Engineering

- Casey, Kenneth. The Determination of Ammonia Emissions from Mechanically Ventilated Poultry Houses: An Examination of the Issues Involved.
- Danao, Mary-Grace. Enhanced Optical Detection of Microparticles and Bacteria Cells in Water Using Stationary Acoustic Wave Fields.
- Day V., George B. Granular Mechanics Formulary for Soft Red Winter Wheat in Corrugated Storage Bins.
- Purswell, Joseph. Characterization of Ventilation and Thermal Environment in a Horse Trailer during Transport.

Entomology

- Quinton, Scott E. Economic Injury Levels and Economic Thresholds for the European Corn Borer, *Ostrinia nubilalis* (Hubner), and the Corn Leaf Aphid, *Rhopalosiphum maidis* (Fitch), on Quality Enhanced Maize in Kentucky.
- Xi, Zhiyong. Generation of Novel Symbiosis in Mosquito via Embryo Microinjection and Characterization of the *Wolbachia*/Host Interaction.

Horticulture

- Myung, Kyung. Biosynthesis of Trans 2-hexenal in Response to Wounding in Strawberry Fruit and Interaction of Trans 2-hexenal with *Botrytis cinerea*.

Plant and Soil Sciences (Agronomy)

- Forbes, Kevin P. Characterization of Plant Polyadenylation Trans-Acting Factors That Modify Poly(A) Polymerase Activity.
- Harrell, Michael S. Color Enhancement of Creeping Bentgrass (*Agrostis stolonifera* L.) Turf with Foliar-Applied Urea-Nitrogen.
- Luo, Wensui. Influence of Plant Secondary Metabolites and Surfactant on Polychlorinated Biphenyl Removal and Soil Microbial Populations.
- Marshall, Michael W. Biology and Carbohydrate Fluctuations of Trumpet creeper (*Campsis radicans* [L.] Seem.) and Its Control in No-Tillage and Minimum-Tillage.
- Meeks, Lisa R. Isolation and Characterization of the Four *Arabidopsis thaliana* Poly(A) Polymerase Genes.
- Siangdung, Wipawan. Improvement of Leaf Aldehyde Production.
- Zhu, Cong. Gene Regulatory Networks of AGL 15, a Plant MADS Transcription Factor.

Plant Pathology

- Cheng, Chi-Ping. Viral RNA Elements and Host Genes Affecting RNA Recombination in Tombusviruses.
- Rehmeyer, Cathryn J. Richardson. Sequencing of Chromosome Ends and Characterization of a Telomere-Linked Helicase Gene Family in the Rice Blast Fungus *Magnaporthe oryzae*.
- Zhang, Chunquan. Genetic Diversity of Bean Pod Mottle Virus (BPMV) and Development of BPMV as a Vector for Gene Expression in Soybean.

Veterinary Science

- Muthupalani, S. Characterization, Immunogenicity, and Possible Roles of *Streptococcus equi* Linkage Group Proteins in the Pathogenesis of Strangles.
- Zhang, J. Permissiveness of Selected Cell Lines to Equine Arteritis Virus: Establishment, Characterization, and Significance of Persistent Infection in HeLa Cells.

M.S. Theses

Agricultural Economics

- Eldridge, Roger W. Kentucky Feeder Cattle Price Analysis: Models for Price Predictions and Grazing Management.
- Lunsford, Terry L. Characteristics of Beef Cattle That Determine the Price Difference between Traditional and CPH Sales.
- Kumar, Sanjeev. Demand Determinants for U.S. Exports of Processed Foods to Emerging Market Economies.
- Nagy, Reka. Effects of Management on Reproductive Efficiency in Thoroughbreds.
- Vercken De Vreuschme, Camille. Are Pinhooked Yearlings Different? A Hedonic Pricing Analysis of Yearlings at the Select Auctions.

Animal and Food Sciences

- Elmore, Curt A. Efficacy of Chromium Picolinate in Reducing Stress in Finishing Pigs Fed Ractopamine HCL.
- Johnston, Joshua E. Quality Effects of Freezing and Thawing Method on Whole Muscle Cuts of Meat during Frozen Storage.
- Mays III, Charles E. Effects of Endophyte-Infected Fescue and FEB-200TM on Reproductive Performance of Beef Bulls.
- Scramlin, Stacy M. The Effects of Brine Enhancement, Cookery Temperature, and Natural Antioxidants on the Quality Attributes of Beef Longissimus Dorsi and Semimembranosus Muscles of Different Ages.
- Sepe, Hilary A. Quality Attribute Characterization of Underutilized Beef Muscles.
- Varble, Jaime C. Quality Attributes of Beef Longissimus Dorsi and Semitendinosus Muscles from Cattle of Varying Maturity as Affected by Brine Enhancement and Cookery Method.

Biosystems and Agricultural Engineering

- Reilly, John C. Demand Controlled Ventilation for Residential Homes.
- Sisk II, Jerry L. A Fuzzy Logic Approach for Determining Optical Cropping Patterns Based on Field Boundary Geometry.

Entomology

Choate, Beth A. The Life History and Dispersal Patterns of *Malacosoma americanum*, the Insect Associated with Mare Reproductive Loss Syndrome.

Maier, Reid M. Biology and Management of the Ant, *Lasius neoniger* (Emery), on and around Golf Course Putting Green.

Prater, Callie A. Microbial Control of the Black Cutworm (*Agrotis ipsilon*) in Turfgrass Using a Naturally Occurring Baculovirus.

Forestry

Dillaway, Dylan N. Response of Natural and Artificial Oak Regeneration to Changes in Light Regimes.

Green, Stephanie R. The Effects of Prescribed Fire on Stand Structure, Canopy Cover, and Seedling Populations in Oak-Dominated Forests on the Cumberland Plateau, Kentucky.

Ter Beest, Julia. Effects of a Restored Elk Population on Soils, Vegetation, and Water Quality in Eastern Kentucky.

Horticulture

Dutt, Manjul. Using Sequential Imagery to Evaluate Aspects of Seed Vigor and Germination.

Merchandising, Apparel, and Textiles

Crawford, Cassandra. Retail Internationalization: The Influence of Culture on Product Development Issues.

Joshi, Preeti. Relationships between Consumers' Shopping Orientation, Prior Purchase Experience, and Online Purchase Intention.

Turner, Mike. Country Selection in International Sourcing Decisions: A Proposed Framework.

Plant and Soil Sciences (Agronomy)

Akshale, Michael S. Evaluating Soybean Rooting Type, Pubescence Density, and Pubescence Color for Improving Drought Tolerance.

Bec, Sladana. Production System for Extending Harvest of Fresh-Market Edamame in Kentucky.

Hyatt, Jessica E. Relationship of Soil Compaction to Soybean Seedling Emergence.

Sears, Brandon G. Corn Grain Yield Variability across a Central Kentucky Landscape.

Zhu, Jie. *In vitro* Selection of ssDNA Aptamers That Bind Herbicides and Antibiotics.

Plant Pathology

Mundell, Jaclyn N. Phylogenetic Analysis of Kentucky Strains of *Xylella fastidiosa*.

Veterinary Science

Hall, David C. An Epidemiological Study of Leptospira-Induced Abortion in Mares in Central Kentucky (1990-2004).

Herman, Rebecca K. Regulation of Host Cell Apoptosis by the Protozoan Parasite *Neospora caninum*.

Graduate Enrollment and Degrees

Note: Graduate enrollment and graduate figures are reported by academic year by graduate program for the 2004 First Summer Session, 2004 Second Summer Session, 2004 Fall Semester, 2005 Spring Semester. Graduation figures include the 2004 Second Summer Session, 2004 Fall Semester, and 2005 Spring Semester. These figures are from the Graduate School's Annual Statistical Report.

	Enrollment			03-04 Degrees Awarded			04-05 Degrees Awarded			Net
	03-04	04-05	Net	Master's	Doctoral	Total	Master's	Doctoral	Total	
Agricultural Economics	54	51	-3	5	3	8	12	4	16	8
Animal and Food Sciences	67	54	-13	11	11	22	6	3	9	-13
Biosystems and Agricultural Engineering	33	38	5	9	2	11	9	3	12	1
Crop Science	14	29	15	0	1	1	1	3	4	3
Entomology	34	45	11	3	3	6	11	2	13	7
Family Studies	70	52	-18	13	1	14	4	2	6	-8
Forestry	17	24	7	3	*	3	4	*	4	1
Hospitality and Dietetic Administration	15	13	-2	2	*	2	2	*	2	0
Interior Design, Merchandising, and Textiles**	9	13	4	1	*	1	5	*	5	4
Plant Pathology	22	34	12	0	5	5	0	3	3	-2
Plant Physiology	18	29	11	*	3	3	*	6	6	3
Plant and Soil Science	36	26	-10	4	*	4	9	*	9	5
Rural Sociology/Career, Technology, and Leadership Education	49	58	9	19	0	19	5	3	8	-11
Soil Science	11	14	3	*	1	1	*	1	1	0
Veterinary Science	29	33	4	2	3	5	4	4	8	3
Total	478	513	35	72	33	105	72	34	106	1

* 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 2005

Income	
Federal Funds	
Hatch	\$3,888,038
Hatch Multistate	853,897
McIntire-Stennis	464,080
Animal Health	57,272
Total Federal Funds	\$5,263,287
State Funds	28,413,787
Total Funds	\$33,677,074

Expenditures	Federal	State	Total
Personal Services	\$4,513,209	\$16,501,585	\$21,014,794
Travel	58,395	253,045	311,440
Equipment	164,202	830,513	994,715
Other Operating Expenses	527,481	10,828,644	11,356,125
Total Expenditures	\$5,263,287	\$28,413,787	\$33,677,074

Staff

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Myra Leigh Tobin

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Billy B. Wilcoxson

Barbara S. Young

Faculty Members:

Roy L. Moore and Jeffrey B. Dembo

Staff Member:

Russ Williams

Student Member:

Rebecca Ellingsworth

Agricultural Experiment Station

January 1, 2005-December 31, 2005

Administration

Lee T. Todd Jr., President

Michael T. Nietzel, Provost

M. Scott Smith, Dean & Acting Provost

H.C. Owen, Treasurer

Nancy M. Cox, Associate Dean for Research & Director

Linus R. Walton, Associate Dean for Administration

Lisa Collins, Assistant Director

J. D. Lawson, Assistant Director for Legal & Fiscal Affairs

W. O. Peterson, Director of Management Operations

Departments

Following are Experiment Station personnel lists for calendar year 2005 as reported by departments. (R) denotes Experiment Station appointment.

Agricultural Communications

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

Agricultural Economics

Robbins, L.W., Professor and Chair (R)
Brown, R., Lecturer (R)
Debertin, D.L., Professor (R)
Dillon, C., Associate Professor (R)
Fleming, R., Associate Professor (R)
Freshwater, D., Professor (R)
Infanger, C.L., Extension Professor
Isaacs, S., Extension Professor
Jones, L.D., Extension Professor (R)
Marchant, M.A., Professor (R)
Mather, L.L., Associate Professor (R)
Maynard, L., Associate Professor (R)
Meyer, A.L., Extension Professor
Pagoulatos, A., Professor (R)
Pushkarskaya, H.N., Assistant Professor (R)
Reed, M.R., Professor (R)
Riggins, S.K., Extension Professor
Saghaian, S., Assistant Professor (R)
Scorsone, E., Assistant Extension Professor
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)
Alderton, A.L., Assistant Professor (R)
Amaral-Phillips, D.M., Associate 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)
Coffey, R.D., Associate Extension Professor
Coleman, R.J., Associate Extension Professor
Crist, W.L., Post-Retirement Extension Professor
Cromwell, G.L., Professor (R)

Dawson, K.A., Adjunct Professor
Edgerton, L.A., Associate Professor (R)
Ely, D.G., Professor (R)
Harmon, D.L., Professor (R)
Heersche Jr., G., Extension Professor
Hennig, B., Professor (R)
Hicks, C.L., Professor (R)
Jackson Jr., J.A., Associate Professor (R)
Johns, J.T., Post-Retirement Extension Professor
Lawrence, L.M., Professor (R)
Lindemann, M.D., Professor (R)
Matthews, J.C., Associate Professor (R)
McAllister, A.J., Extension Professor
McLeod, K.R., Assistant Professor (R)
Mikel, W.B., Extension Professor
Newman, M.C., Associate Professor (R)
O'Leary, J., Extension Associate Professor
Parker, G.R., Extension Professor
Pescatore, A.J., Extension Professor
Schillo, K.K., Associate Professor (R)
Silvia, W.J., Professor (R)
Strobel, H.J., Associate 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

Gates, R.S., Professor and Chair (R)
Byers, M., Adj. Assistant Professor (R)
Carey, D., Adj. Assistant Professor (R)
Castillo, M., Assistant Research Professor (R)
Colliver, D.G., Associate Professor (R)
Crofcheck, C., Assistant Professor (R)
Duncan, G.A., Post-Retirement Extension Professor (R)
Edwards, D.R., Professor (R)
Fehr, R., Extension Professor (R)
McNeill, S.G., Associate Extension Professor (R)
Montross, M.D., Associate Professor (R)
Nokes, S.E., Associate Professor (R)
Norikane, J., Assistant Professor (R)
Overhults, D.G., Associate Extension Professor (R)
Payne, F.A., Professor (R)
Rohlf, R., Adj. Assistant Professor (R)
Shearer, S.A., Professor (R)

Stombaugh, T.D., Assistant Extension Professor (R)
Taraba, J., Extension Professor (R)
Warner, R.C., Extension Professor (R)
Wells, L.G., Professor (R)
Wheeler, E., Adj. Assistant Professor (R)
Wilkerson, E., Assistant 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)
Harris, R., Associate Professor (R)
Horstmeier, R.P. Assistant Professor (R)
Hustedde, R., Extension Professor
Jones, K., Extension Assistant Professor (R)
Kitchel, T., Assistant Professor (R)
Maurer, R., Extension Professor
Nall, M., Extension Professor
Tanaka, K., Assistant Professor (R)
Warner, P., Extension Professor
Weckman, R., Associate Professor
Witham, D., Professor
Zimmerman, J., Associate Extension Professor (R)

Entomology

Obrycki, J.J., Professor and Chair (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., Associate Professor (R)
Haynes, K.F., Professor (R)
Johnson, D.W., Extension Professor
Palli, S.R., Associate Professor (R)
Potter, D.A., Professor (R)
Potter, M.F., Extension Professor
Rieske-Kinney, L.K., Associate 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
Wise, D.H., Professor (R)
Yeagan, K.V., Professor (R)

Family Studies

Dyk, P., Associate Professor and Acting Chair (R)
Bradford, K.P., Assistant Professor
Brock, G.W., Professor
Ellington, V., Lecturer
Flashman, R.H., Extension Professor
Forgue, R.E., Associate Professor
Hans, J.D., Assistant Professor
Heath, C.J., Professor
Hildreth, G.J., Professor
Kim, H., Assistant Professor
Mowery, R.L., Assistant Professor
Simmons, L.A., Assistant Professor
Smith, D.R., Associate Professor
Turner, L., Lecturer
Vail, A., Extension Professor
Whiting, J.B., Assistant Professor

Forestry

Bullard, S., Professor and Chair (R)
Arthur, M.A., Associate Professor (R)
Barnes, T.G., Extension Professor
Barton, C., Assistant Professor (R)
Conners, T., Associate Extension Professor
Cushing, T., Assistant Professor (R)
Fei, S., Assistant Professor (R)
Graves, D.H., Extension Professor (R)
Hill, D.H., Extension Professor
Kalisz, P.J., Associate Professor
Lacki, M.J., Associate Professor (R)
Maehr, D.S., Associate Professor (R)
Ringe, J.M., Professor (R)
Stringer, J.W., Associate Professor (R)
Wagner, D.B., Associate Professor

Horticulture

Ingram, D.L., Professor and Chair (R)
Anderson, R.G., Extension Professor Emeritus (R)
Archbold, D.D., Professor (R)
Buxton, J.W., Associate 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
Kemp, T.R., Professor (R)
Masabni, J.G., Assistant Extension Professor (R)
McNiell, R.E., Extension Professor Emeritus (R)
Rowell, A.B., Extension Professor (R)
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
Kew, B.W., Assistant Professor
Lee, B.D., Assistant Professor
Nieman, T.J., Professor (R)

Livestock Disease Diagnostic Center

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Carter, C.N., Professor
Donahue, J.M., Professor
Giles, R.C., Professor
Hong, C.B., Professor
Jackson, C.B., Associate Professor
Lehner, A.F., Ag. Research Specialist (R)
Poonacha, K.B., Professor
Scharko, P.B., Associate Professor
Vickers, M.L., Associate Professor
Williams, N.M., Associate 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
Spillman, K.M., Associate Professor
Wesley, S.C., Assistant Professor
Kwon, H., Visiting Scholar (R)

Nutrition and Food Science

Forsythe, H.W., Associate Professor and Chair (R)
Addo, K., Associate Professor (R)
Broum, D.O., Associate Professor (R)
Chen, L., Professor (R)
Chow, C.K., Professor (R)
Cook-Newell, M., Lecturer
Gaetke, L., Associate Professor (R)
Ham, S., Associate Professor (R)
Roseman, M.G., Assistant Professor (R)
Stephenson, T.J., Lecturer
Wesley, M., Associate Professor

Plant and Soil Sciences (Agronomy)

Barrett, M., Professor and Chair
Aiken, G.E., Associate Adjunct Professor
Bailey, W.A., Assistant Extension Professor
Barnhisel, R.I., Professor (R)
Baskin, C., Professor* (R)
Bitzer, M.J., Professor (Emeritus)
Blair, M., Research Specialist

Burton, H.R., Associate Professor (R)
Bush, L.P., Professor (R)
Calvert, J., Research Specialist
Chappell, J., Professor (R)
Collins, G.B., Professor (R)
Cornelius, P.L., Professor (R)
Coyne, M., Associate Professor (R)
D'Angelo, E.M., Associate Professor (R)
Davies, M., Professor and Director, KTRDC
Dinkins, R., Assistant Adjunct Professor
Ditsch, D., Associate Extension Professor
Dougherty, C.T., Professor (R)
Drury, L.T., Research Specialist
Egli, D.B., Professor (R)
Grabau, L.J., Professor (R)
Green, J.D., Extension Professor
Grove, J.H., Associate Professor (R)
Herbek, J.H., Extension Professor
Hildebrand, D.F., Professor (R)
Hill, R., Research Specialist
Hunt, A.G., Professor (R)
Jack, A.M., Research Specialist
Kagan, I., Assistant Professor Adjunct
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Kennedy, B.S., Research Specialist
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Issued 6-2006