The Kentucky Agricultural Experiment Station

118th Annual Report
2005

University of Kentucky • Lexington, Kentucky 40546
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
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**Experiment Station Affiliated Departments and Centers**

- Agricultural Economics
- Animal and Food Sciences
- Biosystems and Agricultural Engineering
- Community and Leadership Development
  - Entomology
  - 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
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 digestor 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 LDCC 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.

<table>
<thead>
<tr>
<th>Total Necropsy Cases</th>
<th>5,104</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avian</td>
<td>160</td>
</tr>
<tr>
<td>Bovine</td>
<td>1,149</td>
</tr>
<tr>
<td>Bovine fetus</td>
<td>136</td>
</tr>
<tr>
<td>Canine and feline</td>
<td>361</td>
</tr>
<tr>
<td>Caprine and ovine</td>
<td>451</td>
</tr>
<tr>
<td>Equine</td>
<td>2,100</td>
</tr>
<tr>
<td>Equine fetus</td>
<td>644</td>
</tr>
<tr>
<td>Porcine</td>
<td>26</td>
</tr>
<tr>
<td>Other species (exotic—zoo, wildlife)</td>
<td>77</td>
</tr>
</tbody>
</table>

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 micro-organisms 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:

<table>
<thead>
<tr>
<th>Pathogen</th>
<th>Tests Completed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Streptococcus equi</td>
<td>608 (63 positive)</td>
</tr>
<tr>
<td>Equine herpesvirus</td>
<td>603 (61 positive)</td>
</tr>
<tr>
<td>Moraxella bovis</td>
<td>37</td>
</tr>
<tr>
<td>Mycoplasma bovis</td>
<td>74</td>
</tr>
<tr>
<td>Lawsonia intracellularis</td>
<td>198 (56 positive)</td>
</tr>
<tr>
<td>Clostridium perfringens</td>
<td>58</td>
</tr>
<tr>
<td>Equine nocardioform placentitis</td>
<td>1,286 (8 positive)*</td>
</tr>
<tr>
<td>Neorickettsia ristici</td>
<td>62 (12 positive)</td>
</tr>
<tr>
<td>West Nile virus</td>
<td>103 (2 positive birds)</td>
</tr>
</tbody>
</table>

* 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:**

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

**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:

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

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

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

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.
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 purchasers 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:

<table>
<thead>
<tr>
<th>Industry</th>
<th>Fee Assessed/Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feed</td>
<td>35 cents/ton</td>
</tr>
<tr>
<td>Fertilizer</td>
<td>50 cents/ton</td>
</tr>
<tr>
<td>Milk (handlers and producers)</td>
<td>0.5 cents/100 lb.</td>
</tr>
<tr>
<td>Seed tags</td>
<td>4-24 cents/unit</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Industry</th>
<th>2005 Income</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feed</td>
<td>$996,896</td>
</tr>
<tr>
<td>Fertilizer</td>
<td>$565,027</td>
</tr>
<tr>
<td>Milk</td>
<td>$191,847</td>
</tr>
<tr>
<td>Seed tags, licenses, and service testing</td>
<td>$391,857</td>
</tr>
<tr>
<td>Soil service testing</td>
<td>$163,297</td>
</tr>
<tr>
<td>Total</td>
<td>$2,308,924</td>
</tr>
</tbody>
</table>

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 type, quality rating, ingredient list, and directions as well as warnings or precautionary statements required for proper use. A nationwide 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-laboratory study on digestion techniques are under way. A paper on laboratory results was presented at the International AOAC and ASFFFCO 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 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:

<table>
<thead>
<tr>
<th>Sample Type</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feed</td>
<td>3,667</td>
</tr>
<tr>
<td>Fertilizer</td>
<td>1,769</td>
</tr>
<tr>
<td>Seed</td>
<td>2,466</td>
</tr>
<tr>
<td>Milk</td>
<td>4,910</td>
</tr>
</tbody>
</table>
**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:**

<table>
<thead>
<tr>
<th>Sample Type</th>
<th>2005 Completed Samples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Official samples</td>
<td>2,466</td>
</tr>
<tr>
<td>Service samples</td>
<td>5,245</td>
</tr>
<tr>
<td>Tobacco</td>
<td>1,347</td>
</tr>
<tr>
<td>Other certified crops</td>
<td>160</td>
</tr>
<tr>
<td><strong>Total Samples</strong></td>
<td><strong>7,711</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Service Tests Conducted</th>
<th>Number</th>
<th>% Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Germination</td>
<td>6,121</td>
<td></td>
</tr>
<tr>
<td>Purity</td>
<td>2,299</td>
<td></td>
</tr>
<tr>
<td>Vigor</td>
<td>209</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>339</td>
<td></td>
</tr>
<tr>
<td><strong>Total Service Tests</strong></td>
<td><strong>8,966</strong></td>
<td></td>
</tr>
</tbody>
</table>

**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:

<table>
<thead>
<tr>
<th>Type</th>
<th>Number</th>
<th>% Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture</td>
<td>32,481</td>
<td>3</td>
</tr>
<tr>
<td>Home lawn and garden</td>
<td>6,237</td>
<td>-2</td>
</tr>
<tr>
<td>Commercial horticulture</td>
<td>792</td>
<td>20</td>
</tr>
<tr>
<td>Greenhouse media</td>
<td>64</td>
<td>-9</td>
</tr>
<tr>
<td>Research</td>
<td>8,628</td>
<td>-11</td>
</tr>
<tr>
<td>Atrazine residue in soil</td>
<td>14</td>
<td>-26</td>
</tr>
<tr>
<td>Animal waste</td>
<td>250</td>
<td>15</td>
</tr>
<tr>
<td>Nutrient solution</td>
<td>33</td>
<td>27</td>
</tr>
<tr>
<td>Special research solutions</td>
<td>1,597</td>
<td>81</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>50,096</strong></td>
<td>1</td>
</tr>
</tbody>
</table>
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.
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 (ERTL):** 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, KW1 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 Tates 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**


**Animal and Food Sciences**


**Biosystems and Agricultural Engineering**


**Community and Leadership Development**


**Entomology**


Forestry

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.I.

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 Economic 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-kB, and Carcinogenesis—Glazer, 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 Rhadovirus—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—Swerczek, 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 equis—Timoney, J.F.

Pregnancy Maintenance in Mares—McDowell, K.J.


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—$4,333,337
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—Booright, 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., Gaette, L.
Quality Attribute Characterization of Beef Long-Term Muscles, National Cattlemen’s Beef Association, $15,956—Alderton, A., Mitkel, 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
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.
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—Pierce, 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—Marchant, M., Stombaugh, T., Barton, C.
Device for Inspecting Agricultural Products for Safety, Agricultural Research Service, $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.

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 Segmented 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—Pierce, L., Hensel, 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., $2,085—Wells, L.
Monitoring Ammonia Emissions, Iowa State University, $92,121—Gates, R., Overhults, D.
Stream Restoration in Guy Cove, Kentucky Department of Fish and Wildlife, $175,560—Agouridis, C., Barton, C., Warner, R.
Syneresis Sensor Technology Development for Cured Meat Content Control, Cooperative State Research Education and Extension, $350,000—Payne, F., Castilo, 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—Hustede, R., Jones, L.
Improving the UK Pre-Service Teacher Education Programs in Agriculture, Kentucky Department for Technical Education, $7,250—Horsmeier, 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—Horsmeier, R., Nall, M.
Rebuilding Trust in Beef: The New Science-Based Food Safety Regime in Japan, National Science Foundation, $72,827—Tanaka, K.; Schlo, K.
Refining the UK Agricultural Education Program through Faculty Professional Development, Kentucky Department for Technical Education, $8,150—Horsmeier, 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, $131,625—Dobson, S.
Molecular Analysis of Juvenile Hormone Action, National Institute of General Medical Sciences, $204,000—Palli, S.
MorphBank: Web Image Database Technology for Comparative Morphology and Biodiversity Research, Florida State University, $20,000—Sharkey, M.
Potentiation of Pest Control by Insect Immunosuppression, Binational Agricultural Research & Development Fund, $145,200—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.
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 Wollbachia Symbionts, National Institute of Allergy and Infectious Diseases, $204,000—Dobson, S.
Wollbachia Research Coordination Network, National Science Foundation, $99,394—Dobson, S.
E-eXtension
Total—$556,905
ECOP/CSREES E-eXtension, University of Nebraska, $536,905—Wood, C., Craycroft, 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—Kurzynske, J.
CYFERNET-Program, Cooperative State Research Education and Extension, $180,200—Kurzynske, 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—Siger, 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/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.
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.
Forestry Stewardship Public Awareness, Publicity and Training, Kentucky Natural Resources Environmental Protection Cabinet, $10,000—Stringer, J.
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<tr>
<th>Project Title</th>
<th>Funding Source</th>
<th>Amount</th>
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<td><strong>Development and Improvement of Grape and Collaborative Research</strong></td>
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<td>Maintenance of a Chloroplast-Localized N-Terminal Protein</td>
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<td><strong>Horticulture</strong></td>
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<td>Translating Air Quality Regulations for Operation Military Kids, Auburn University</td>
<td>National Institute on Alcohol Abuse and Alcoholism</td>
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<td>Status, Distribution, and Reproductive Characteristics of River Otters in Kentucky</td>
<td>Kentucky Department of Fish and Wildlife</td>
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<td>Survey of Forest Bats in Managed Coniferous Forests of North-Central Idaho</td>
<td>Idaho State Department of Fish and Game</td>
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<td>The Influence of Riparian Management Prescriptions on the Use of Upland and Riparian Habitats by Bats in Forests of the Pacific Northwest</td>
<td>Northwest Bat Management Cooperative</td>
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<td>Timber Harvesting and Silvicultural Systems to Promote Forest Health in Kentucky</td>
<td>Kentucky Department for Natural Resources</td>
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<td><strong>4-H Central Operations</strong></td>
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<td>Operation Military Kids, Auburn University</td>
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<td>Positive Youth Development State and Local Collaboration Demonstration Project</td>
<td>Administration for Children and Families</td>
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<td>Translating Air Quality Regulations for Extension Professionals, Environmental Protection Agency</td>
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<td>A Spatial Decision Support System for Expanding Viticulture in North-Central Kentucky and Southern Ohio</td>
<td>Cornell University</td>
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<td>Chloroplast-Localized N-Terminal Protein Processing by Peptide Deformylase</td>
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<td>Collaborative Research: Maintenance of a Functional Proteome through Dynamic Repair</td>
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<td>Development and Improvement of Grape and Wine Industry to Benefit the Agriculture Economy of Kentucky</td>
<td>Kentucky Department of Agriculture</td>
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<td><strong>Kentucky Tobacco Research and Development Center</strong></td>
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<td>Application of Plant Genomics to Alcoholic Brain Damage</td>
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<td>Development of Screens for Drugs in Alcohol Dependence</td>
<td>National Institute on Alcohol Abuse and Alcoholism</td>
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<td>KSTC R&amp;D Voucher: Application of NPG Technology to Alternate Plant Species</td>
<td>AgriGrow Technologies Inc.,</td>
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<td><strong>Livestock Disease Diagnostic Center</strong></td>
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<td><strong>Plant and Soil Sciences (Agronomy)</strong></td>
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<td>Transgenic Plant Cells as Sources of Hepatoprotective Drugs</td>
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<td><strong>Landscape Architecture</strong></td>
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<td><strong>Merchandising, Apparel, and Textiles</strong></td>
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Assessing RNAi As A Reverse Genetic Tool for Global Analysis of NBS-LRR Gene Function in Medicago truncatula, Cooperative State Research Education and Extension, $12,000—Wagner, G.

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—Smirnova, B.

KSEF R&D Excellence: 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 Use in the Production of Vaccines, Animal Disease Control and Food Safety, University of Kentucky, $26,500—Van Sanford, D.

KSTC R&D Voucher: Engineering Yeast for Use in the Production of Vaccines, Animal Disease Control and Food Safety, University of Kentucky, $26,500—Van Sanford, D.

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KSTC R&D Voucher: Engineering Yeast for Use in the Production of Vaccines, Animal Disease Control and Food Safety, University of Kentucky, $26,500—Van Sanford, D.

KSEF R&D Excellence: Development of Management Strategies to Control Major Soybean Virus Diseases in the North Central States, Iowa State University, $25,189—Schardl, C.

Fungal Management of Soybean Rust, Agricultural Research Service, $20,000—Hershmam, D.

Gene Expression Profiles in a Grass-Endophyte Symbiosis, Cooperative State Research Education and Extension, $390,000—Schardl, C., Hildebrand, D.

Genetic Engineering of Legume Genes Required for Nodulation, National Science Foundation, $118,511—Kachroo, P., Kachroo, A.

Gene Expression Profiles in a Grass-Endophyte Symbiosis, Cooperative State Research Education and Extension, $390,000—Schardl, C., Hildebrand, D.

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Genetic Engineering of Legume Genes Required for Nodulation, National Science Foundation, $118,511—Kachroo, P., Kachroo, A.
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.

Partnership for a Green City, Kentucky Natural Resource Academy for Urban Youth, MOA No. OSP 2006-019, Murray State University, $10,000—Hershman, D.

Mare Reproductive Loss Syndrome (MRLS) in Kentucky University Partnership for Comprehensive Commonwealth Water Resources Environmental Protection Cabinet, $19,500—Hanley, C.

Toxin Biosynthesis Genes in Ergot Alkaloid-Producing Fungi, West Virginia University, $129,000—Scharff, 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—Cohan, 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 Zylexix 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—Artiushin, 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—Heming, 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—Maehr, 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—Heming, J.C., Hustedde, R.J., Nesmith, W.C., Neteman, M.C., Pridly, 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, $36,282—Alexander, L., 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—Heming, B.

Ultrasonic Process for Improved Biodiesel Production, Kentucky Soybean Promotion Board, $59,907—McNeill, S.G., Sherer, 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 AY953135.
Webb, B.A. Campoletis sonorensis ichnovirus segment I2 vankyrin 2 mRNA, complete cds gi. ACCESSION AY953134.
Webb, B.A. Campoletis sonorensis ichnovirus innexin Vnx-II gene, complete cds gi. ACCESSION AY197485.
Webb, B.A. Campoletis sonorensis ichnovirus segment I2 vankyrin 1 mRNA, complete cds gi. ACCESSION AY953133.
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.

Plant and Soil Sciences (Agronomy)

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

Plant Pathology

Goodin, M.M. Sonchus yellow net virus truncated phosphoprotein gene. ACCESSION AY197195.
Scharf, C.L. The loline alkaloid biosynthesis gene clusters in fungal endophytes of grasses. ACCESSION No. AY7237493, AY7237503, AY7246861.
Scharf, C.L. Ergot alkaloid biosynthesis genes, promoter region and partial cds. ACCESSION Nos. DQ131885, DQ131886.
Scharf, C.L. Ergot alkaloid biosynthesis genes, promoter region and partial cds. ACCESSION No. AY569128.

Veterinary Science

Gaj, R.Y., and D.K. Howe. Sarcocystis neurona major surface antigen 1 gene, promoter region and 5'UTR. Accession No. DQ286460.
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-A577784.
Lear, T.L. Equus caballus 2'-5' oligoadenylate synthetase synthetase 1 (Oas1) mRNA, complete cds. ACCESSION No. AY321355.
Lear, T.L. Equus caballus 2'-5' oligoadenylate synthetase 2 (Oas3) mRNA, complete cds. ACCESSION No. AY569128.
Lear, T.L. Equus caballus 2'-5' oligoadenylate synthetase-like protein (Oasl) 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 ILT1A mRNA for leucocyte immunoglobulin-like receptor, complete cds, allele:ILT1A*001-02. ACCESSION Nos. AB120412, AB120413.
Lear, T.L. Equus caballus ILT11B mRNA for immunoglobulin-like transcript 11 protein, complete cds, allele:ILT1A* ACCESSION Nos. AB120409-AB120411.
Lear, T.L. Equus caballus ILT1A mRNA for immunoglobulin-like transcript 11 protein, complete cds, allele:ILT1A* 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.


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

Animal and Food Sciences

Community and Leadership Development

Entomology

Family Studies

Forestry
Agricultural Economics


In addition, members of the department published seven abstracts.

Animal and Food Sciences


Tseng, Y.C., Y.L. Xiong, and C.D. Webster. The preservation of muscle quality from Australian red crab crayfish (Cherax quadrirarinus) by antioxidant dipping treatments. International Journal of Food Science and Technology 40:841-848.

Wang, L.L., and Y.L. Xiong. Inhibition of lipid oxidation in cooked beef patties by hydrolyzed potato protein is related to its reducing and radical scavenging ability. Journal of the Agricultural and Food Chemistry 53:9186-9192.


**Biostystems and Agricultural Engineering**


Ingram, C.W., M.S. Coyne, and D. Williams. Effect of commercial diazinon and imidacloprid on microbial urease activity in soil and sod. Journal of Environmental Quality 34:1573-1580.


R.S. Gates contributed to one publication with primary author in the Animal and Food Sciences Department.

Community and Leadership Development


In addition, members of the department published seven abstracts.

Entomology


In addition, members of the department published 20 abstracts.

**Family Studies**


**Forestry**


**Horticulture**


Xu, Q., Zhang, D., and Downie, B. Rapid and efficient subcloning of DNA without dephosphorylation or gel electrophoresis. Molecular Biotechnology 29:111-118.
In addition, members of the department published two abstracts.

**Landscape Architecture**


**Livestock Disease Diagnostic Center**

In addition, members of the department published two abstracts.

**Merchandising, Apparel, and Textiles**


**Nutrition and Food Science**

In addition, members of the department published 27 abstracts.

**Plant and Soil Sciences (Agronomy)**


Kleiber, C., B.C. McConm, D.W. Horohov, R.S. Pirie, A. Zurbriggen, and R. Straub. Cytokine profiles of peripheral blood and airway CD4 and CD8 T lymphocytes in horses with recurrent airway obstruction. Veterinary Immunology and Immunopathology 104(1-2):91-97.


Lyons, E.T. Historic importance of some aspects of research by O. Wilford Olsen on hookworms (Uncinaria stenocephala) and Steller sea lions (Eumetopias jubatus) in 1951 on St. Paul Island, Alaska. Parasitology Research 95:353-357.


Timoney, J.F., E. Hartmann, L. Fallon, and J. Walker. Antibody responses of mares to prepartum vaccination with Clostridium perfringens bacterin supplemented with recombinant Beta2 toxin. Veterinary Record 157:810-811.


In addition, members of the department published 44 abstracts.
Other Research Publications

Agricultural Economics
Freshwater, D. External Constraints and Opportunities for the Farm Credit System. Report prepared for the Horizons Project of the Farm Credit System. March.


Animal and Food Sciences


Biosystems and Agricultural Engineering


Wells, L., and C. Crotcheck. Educational objectives and outcomes at the University of Kentucky: Perspectives from a recently reviewed program. Presented at the 2005 ASABE Annual International Meeting, Tampa, Fla. ASABE No. 05-7059.

Community and Leadership Development


Entomology


Family Studies


Forestry


Barnes, T.G. Designing living room with native plants. Kentucky Gardener 3(7):44-45.


Barnes, T.G. The July shade garden in Kentucky: It doesn’t have to be all ferns and hostas—try a little color. Kentucky Gardener 3(6):14-16.


**Plant Pathology**


**Veterinary Science**


Horohov, D.W. Immunology and immunopathology of the equine lung. Mucosal Immunology Conference Proceedings, The Ohio State University, Columbus, Ohio.


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.


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.
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.

Biosystems and Agricultural Engineering
Purswell, Joseph. Characterization of Ventilation and Thermal Environment in a Horse Trailer during Transport.

Entomology
Quinten, Scott E. Economic Injury Levels and Economic Thresholds for the European Corn Borer, Ostrinia nubilalis (Hubner), and the Corn Leaf Aphid, Rhopalosiphum maidis (Finch), on Quality Enhanced Maize in Kentucky.

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.
Marshall, Michael W. Biology and Carbohydrate Fluctuations of Trumpetcreeper (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.
Siangdong, 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.
Zhang, Chianquan. 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.
Zhong, 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
Elderidge, Roger W. Kentucky Feeder Cattle Price Analysis: Models for Price Predictions and Grazing Management.
Lansford, Terry L. Characteristics of Beef Cattle That Determine the Price Difference between Traditional and CPH Sales.
Kumar, Satheer. Demand Determinants for U.S. Exports of Processed Foods to Emerging Market Economies.
Nagy, Reka. Effects of Management on Reproductive Efficiency in Thoroughbreds.

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-20TM 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.
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, Calle 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.

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.

Plant and Soil Sciences (Agronomy)
Akhwale, Michael S. Evaluating Soybean Rooting Type, Pubescence Density, and Pubescence Color for Improving Drought Tolerance.

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.

<table>
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<tr>
<th>Enrollment</th>
<th>03-04 Degrees Awarded</th>
<th>04-05 Degrees Awarded</th>
<th>Net</th>
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<tbody>
<tr>
<td></td>
<td>Master’s</td>
<td>Doctoral</td>
<td>Total</td>
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<tr>
<td>Agricultural Economics</td>
<td>54</td>
<td>1</td>
<td>13</td>
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<tr>
<td>Animal and Food Sciences</td>
<td>67</td>
<td>1</td>
<td>13</td>
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<td>Biosystems and Agricultural Engineering</td>
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<td>Family Studies</td>
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<td>Hospitality and Dietetic Administration</td>
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<td>2</td>
<td>2</td>
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<td>Interior Design, Merchandising, and Textiles**</td>
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<td>4</td>
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<td>Plant Pathology</td>
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<td>Plant and Soil Science</td>
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<td>Rural Sociology/Career, Technology, and Leadership Education</td>
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<td>Soil Science</td>
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<td>Veterinary Science</td>
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<td>Total</td>
<td>478</td>
<td>106</td>
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* Degree type not offered.
** Includes graduate student numbers in the joint School of Design Interior Design, Merchandising, and Textiles program.
## Statement of Current General Fund Income and Expenditures
### Fiscal Year 2005

### Income

<table>
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<th>Federal Funds</th>
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<td>Hatch</td>
<td>$3,888,038</td>
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<td>Hatch Multistate</td>
<td>853,897</td>
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<tr>
<td>McIntire-Stennis</td>
<td>464,080</td>
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<tr>
<td>Animal Health</td>
<td>57,272</td>
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<tr>
<td><strong>Total Federal Funds</strong></td>
<td><strong>$5,263,287</strong></td>
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| State Funds            | 28,413,787 |

**Total Funds** $33,677,074

### Expenditures

<table>
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<th>Expenditures</th>
<th>Federal</th>
<th>State</th>
<th>Total</th>
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<td>Personal Services</td>
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<td>Travel</td>
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<td>Equipment</td>
<td>164,202</td>
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<td>Other Operating Expenses</td>
<td>527,481</td>
<td>10,828,644</td>
<td>11,356,125</td>
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<tr>
<td><strong>Total Expenditures</strong></td>
<td><strong>$5,263,287</strong></td>
<td><strong>$28,413,787</strong></td>
<td><strong>$33,677,074</strong></td>
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</tbody>
</table>
Staff

University of Kentucky Board of Trustees 2005
James F. Hardymon, Chairperson
Mira S. Ball
Stephen P. Branscum
Penelope A. Brown
Dermontti F. Dawson
Marianne Smith Edge
Ann Brand Haney
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Billy Joe Miles
Phillip R. Patton
Steven S. Reed
C. Frank Shoop
Myra Leigh Tobin
JoEtta Y. Wickliffe
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)
Deberit, 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., Associate Professor (R)
Marynard, 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
Saghahian, S., Assistant Professor (R)
Scorsone, E., Assistant Extension Professor
Skees, J.R., Professor (R)
Snell, W.M., Extension Professor
Trumble, 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)
Allderton, A.L., Assistant Professor (R)
Amaral-Phillips, D.M., Associate 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)

**Biosystems and Agricultural Engineering**

Dawson, K.A., Adjunct Professor
Edgerton, L.A., Associate Professor (R)
Ely, D.G., Professor (R)
Harmon, D.L., Professor (R)
Hersche 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
Neuman, M.C., Associate Professor (R)
O’Leary, J., Extension Associate Professor
Parker, G.R., Extension Professor
Pescatora, A.J., Extension Professor
Schillo, K.K., Associate Professor (R)
Silka, W.J., Professor (R)
Stormb, H.J., Associate Professor (R)
Thrift, F.A., Professor (R)
Tidwell, J., Adjunct Assistant Professor
Vant, E.S., Associate Professor (R)
Wang, C., Adjunct Assistant Professor
Webster, C., Adjunct Assistant Professor
Xiong, Y., Professor (R)

**Entomology**

Obrzycki, 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-Kimney, L.K., Associate Professor (R)
Sedlack, 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)
Yeargan, K.V., 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)
Burmester, 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)
Maer, N., Extension Professor
Null, 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)
Plant Pathology
Smith, D.A., Professor and Chair
Bachi, P.R., Ag. Research Specialist
Beale, J.W., Ag. Research Specialist
De Sa Guimaraes, P., Ag. Research Specialist
Farman, M.L., Associate Professor (R)
Ghabrial, S.A., Professor (R)
Goodin, M.M., Assistant Professor (R)
Hartman, J.R., Extension Professor
Hershman, D.E., Extension Professor
Kachroo, D.E., Extension Professor
Kachroo, P.R., Assistant Professor (R)
Kakoo, A.P., Ag. Research Specialist
Nagy, P.D., Associate Professor (R)
Nuckles, E.M., Ag. Research Specialist
Pogany, J., Ag. Research Specialist
Seebold Jr., K.W., Assistant Extension Professor
Thornbury, D.W., Scientist II
Vaillancourt, L.J., Associate Professor (R)
Vincelli, P., Extension Professor
Wang, B., Ag. Research Specialist

Regulatory Services
Miller, E., Director
Barrow, M., Regulatory Specialist Inspector
Bartos, J., Regulatory Specialist Inspector
Bryant, M., Feed/Fertilizer Laboratory Coordinator
Buckingham, D.T., Seed Regulatory Coordinator
Burden, T., Regulatory Specialist Inspector
Coffey, D.S., Regulatory Specialist Inspector
Finn, C.H., Seed Testing Coordinator
Flood, J.S., Regulatory Specialist Inspector
Hickerson, R.R., Regulatory Specialist Inspector
Johnston, C.B., Regulatory Specialist Inspector
Johnston, N.T., Regulatory Specialist Inspector
Mason, D.W., Regulatory Specialist Inspector
McMurry, S.W., Inspection Program Coordinator
Pinkston, W.P., Regulatory Specialist Inspector
Prather, T.G., Regulatory Specialist Inspector
Sikora, F.J., Soil Testing Coordinator & Professor
Spencer, H.S., Auditor
Terry, D.L., Fertilizer Regulatory Coordinator and Assistant Director
Thompson, C.D., Milk Regulatory Coordinator
Traylor, S.L., Feed Regulatory Coordinator
Whitehouse, W.J., Regulatory Specialist Inspector

Robinson Station
Ditsch, D., Acting Superintendent

Tracy Farmer Center for the Environment
Hanley, Carol, Director of Education and Communications

Veterinary Science
Timoney, P.J., Professor and Chair (R)
Allen, G.P., Professor (R)
Artushin, S.C., Assistant Professor (R)
Bailey, E.F., Professor (R)
Balasuriya, U.B., Associate Professor (R)
Chambers, T.M., Associate Professor (R)
Cook, R.F., Assistant Professor (R)
Cohron, E.G., Professor (R)
Dyer, R.M., Professor (R)
Fitzgerald, B.P., Associate Professor (R)
Graves, K.T., Assistant Professor (R)
Horovak, D.W., Professor (R)
Howe, D.K., Associate Professor (R)
Issel, C.J., Professor (R)
Leary, T.L., Associate Professor (R)
Lyons, E.T., Professor (R)
MacLeod, J.N., Professor (R)
McDowell, K.J., Associate Professor (R)
Powell, D.G., Professor
Swerczek, T.W., Professor (R)
Timoney, J.F., Professor (R)
Tobin, T., Professor (R)

West Kentucky Substation
Davis, D., Superintendent