

*The Kentucky
Agricultural Experiment Station*

127th

Annual Report
2014

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

I herewith submit the one hundred and twenty-seventh annual report of the Kentucky Agricultural Experiment Station for the period ending December 31, 2014. This is done in accordance with an act of Congress, approved March 2, 1887, titled "An act to establish Agricultural Experiment Stations, in connection with the Agricultural Colleges established in the several states under the provisions of an act approved July 2, 1862, and under the acts supplementary thereto," and also the act of the Kentucky State Legislature, approved February 20, 1888, accepting the provisions of the act of Congress.

Very respectfully,

A handwritten signature in blue ink that reads "Rick Bennett". The signature is written in a cursive style with a long horizontal stroke at the end.

Rick Bennett
Associate Dean for Research
Director, Agricultural Experiment Station

Lexington, Kentucky
June 30, 2015

Contents

Purpose of the Kentucky Agricultural Experiment Station.....	6
Statewide Research	6
Unit Reports	
Kentucky Tobacco Research and Development Center.....	7
Regulatory Services.....	8
Robinson Center for Appalachian Resource Sustainability	10
UK Ag Equine Programs.....	12
UK Research and Education Center at Princeton	14
UK Veterinary Diagnostic Laboratory.....	17
Kentucky Agricultural Experiment Station Projects.....	28
Collegewide Extramural Funding.....	30
Intellectual Property	34
Publications.....	35
Graduate Degrees.....	56
Financial Statement	59
Staff	60
Departments.....	61

Experiment Station–Affiliated Departments and Centers

Agricultural Economics
Animal and Food Sciences
Biosystems and Agricultural Engineering
Community and Leadership Development
Dietetics and Human Nutrition
Entomology
Family Sciences
Forestry
Horticulture
Kentucky Tobacco Research and Development Center
Landscape Architecture
Plant and Soil Sciences
Plant Pathology
Regulatory Services
Retailing and Tourism Management
Robinson Center for Appalachian Resource Sustainability
School of Human Environmental Sciences
UK Ag Equine Programs
UK Research and Education Center at Princeton
UK Veterinary Diagnostic Laboratory
USDA Agricultural Research Service Forage Animal Production Research Unit
Veterinary Science

Purpose of the Kentucky Agricultural Experiment Station

The University of Kentucky, the state's flagship land-grant institution, 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.

As the research arm of the College of Agriculture, the Kentucky Agricultural Experiment Station has been providing research results to farmers and rural residents for more than 130 years. The continued progress of Kentucky agriculture attests to the benefits of applying new knowledge and technology. College researchers also have successfully addressed problems of agribusiness, consumers, international trade, food processing,

nutrition, community development, soil and water resources, bioenergy, and the environment.

Experiment station research spans both basic and applied sciences. 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 2014. 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

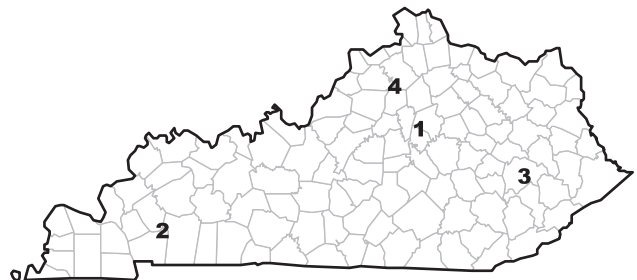
In 2014, research activities of the Kentucky Agricultural Experiment Station were conducted at Lexington, Princeton, Quicksand, and Owenton and in counties throughout the state. Efforts are constantly made to ensure that the research studies have application to the problems of all Kentucky farmers and other clientele groups. Locations of the experimental facilities provide conditions representative of most sections of the state.

Map Position 1

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

Map Position 2

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



Map Position 3

- At Quicksand (Breathitt County), the **Robinson Center for Appalachian Resource Sustainability** 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** (Owen County near Owenton), run as a public-private partnership with the Kentucky Cattleman's Association, demonstration studies are conducted on beef management.

Kentucky Tobacco Research and Development Center

The mission of the Kentucky Tobacco Research and Development Center (KTRDC) is to utilize plant-based technology to benefit Kentucky Agriculture. The focus is on the use of science, including molecular biology, genomics, plant genetic engineering, plant breeding/field research, and other advanced technologies to improve agriculture. Research focuses on applied research in support of Kentucky tobacco production, the enhancement of tobacco and other *Nicotiana* species as a production system for plant-based products (including pharmaceuticals and industrial materials), and for discovering new plant natural products having potential for commercialization. Facilities include research farms, laboratories, greenhouses, and contained growth facilities for plant breeding and disease and genetic engineering research. The goal is to utilize these resources to preserve and strengthen agriculture in Kentucky and, in particular, tobacco agriculture.

Research Program

The KTRDC research program is comprised of six fully supported in-house research programs, one partially supported by partial KTRDC support, and a competitive grants program that encourages and supports research collaborations. Within KTRDC, staff has expertise in plant breeding, the development of molecular markers, applied field research, plant genomics, plant genetic engineering, and tobacco analytical research.

With FDA regulatory authority of tobacco products governed by the Family Smoking Prevention and Tobacco Control Act (FSPTCA), one major research goal has been to identify ways to participate in tobacco research that helps prepare Kentucky for the ensuing changes to the industry. Upgrades in analytical capability and the transition of other tobacco research groups into the KTRDC building have been completed. Pilot research projects have transitioned into much bigger efforts as KTRDC is leveraging our research support to obtain external funding for projects. The uncertainty of how federal regulation will impact Kentucky tobacco producers underscores the critical need for sound science as we continue to adapt our programs to support current tobacco research needs.

As part of this effort, KTRDC applied for and was awarded a five-year cooperative agreement with the FDA. The \$7.9 million in funding is meant to establish programs that are relevant for scientific research on tobacco products and on evolving standards for regulating those products under the FSPTCA. Enhanced analytical capability and relevant in-house expertise at the University of Kentucky played a vital role in the successful submission for this major award. Through the cooperative agreement, KTRDC and UK scientists will work together with the FDA to develop and provide certified reference tobacco products to tobacco researchers around the world. Certified reference tobacco products are necessary tools for scientific analysis used for instrument calibration, method validation, and laboratory proficiency testing as well as for non-clinical investigational purposes. Funding from the cooperative agree-

ment is also being used to establish a center of excellence in tobacco product analysis. Personnel and analytical capability are being added to the current program. The center is expected to coordinate research, design and supply new reference products, and establish a proficiency testing program.

Advanced technology is also being utilized for more traditional tobacco research topics with several projects aimed at combating tobacco diseases, including blue mold, black shank, tomato spotted wilt, frog-eye, and target spot. Some of these efforts have moved from proof of concept to field evaluation and testing. The FT early flowering trait and creation of molecular markers provide additional tools to improve and accelerate the development of tobacco germplasm. Elite tobacco varieties with improved traits for Kentucky tobacco producers will be the direct result of this research. The use of these and other technologies will play an increasingly important role in tobacco research as the industry adapts to FDA regulations.

KTRDC also continues to develop science for alternative uses of the tobacco plant and to identify potential new natural product crops. An example of a potential new use for tobacco comes from the sustained growth in emerging tobacco products such as e-cigarettes and other electronic nicotine delivery systems. Some people predict that the e-cigarette market will overtake that of conventional cigarettes within a decade. If so, this will mean significantly less demand for the burley tobacco grown here in Kentucky. Much of the liquid nicotine currently used in e-cigarettes is believed to be produced overseas where there is considerable uncertainty regarding quality control in the production process. A domestic source of nicotine would have the added benefit that the tobacco was produced under good agricultural practices to reduce the risk of chemical contaminants, which would allow for product traceability, and that the extraction of nicotine would occur under a proven quality-control system. KTRDC has initiated research projects to identify tobacco types and production methods for e-liquid for these developing nicotine delivery systems. These projects are exploring tobacco varieties and production practices suited to nicotine extraction and on-farm initial processing to expand the opportunity for Kentucky growers.

Another potential opportunity for Kentucky farmers involves research to optimize the production of novel natural products from Kentucky native plants. Pilot scale plots have been planted with the expectation of harvesting these plants and conducting research on extraction and purification of compounds of interest.

Many KTRDC research projects were initiated with pilot funding from KTRDC's Tobacco Summit grant program. The program emphasizes collaboration and in many cases has led to significant extramural funding to continue the research. Given the success of the program, KTRDC provided funding for the fourth year of the grants program. Funded Tobacco Summit projects for 2015 are listed below. Research results from the 2013–2014 projects can be found in the KTRDC annual report.

Tobacco Summit Projects

- Evaluation of NNK extract methods
- Tobacco response to burndown herbicides at various pre-transplant intervals
- Establish sample size for testing TSNA in farmer bales
- Reduction of heavy metals in tobacco by clean technologies
- Development of tobacco plants with ultralow alkaloid content by targeted mutation of structural genes involving nicotine biosynthesis
- Develop a greenhouse screening for resistance to fusarium wilt in tobacco
- Addition of blue mold resistance to KTTII burley tobacco varieties
- Controlling endophyte colonization to reduce TSNA in tobacco leaves
- Comparative analyses of the antioxidative capacity of burley varieties that have different TSNA accumulation levels
- Evaluation and control of ground sucker formation in burley tobacco varieties
- In vitro antimicrobial effects of quercetin on tobacco pathogens
- Purification of nicotine from concentrated extracts of green tobacco and dried tobacco lamina: a comparison

Highlights

- Supported 38 research projects/programs. Progress reports can be found in the KTRDC Annual Report for 2013–2014.
- Received a \$7.9 million cooperative agreement awarded from the FDA related to the development of science under the FSPTCA. The five-year partnership provides more than \$5 million in the first year to hire new personnel, establish ana-

- lytical capability, and produce a certified reference cigarette. KTRDC will be working with statistical and bioinformatics personnel from UK's Markey Cancer Center to establish a laboratory proficiency testing program as part of the project.
- Completed a three-year collaboration with the Lawrence Berkeley National Laboratory, the University of California Berkeley, and the Joint Genome Institute funded by the Department of Energy to develop tobacco as a production system for biofuels.
- Analyzed 8,829 tobacco samples and 1,852 fescue forage and seed samples. The analytical lab analyzed samples for 21 different research projects, including support for the regional variety testing program and the development of LC Foundation seed. Both of these programs significantly impact all burley tobacco producers in the United States and throughout much of the world.
- Funded 12 new research collaborations under the Tobacco Summit grant program.
- Filled 230 orders for reference tobacco products in 29 states and 23 countries around the world. The University of Kentucky has provided reference tobacco products for 46 years as a service to the tobacco research industry.
- Produced 10 early flowering in-bred tobacco lines for use in accelerated backcross breeding programs. The application of this and other technologies have the potential to significantly impact the way tobacco will be developed in the future.
- Held leadership roles in international tobacco research organizations including representatives on the Board and Scientific Commission of CORESTA and chair of the TSRC policy committee.
- Conducted 20 field research tests, including one USDA-regulated field test of transgenic tobacco.

Regulatory Services

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

The Division administers four state laws pertaining to ingredients, manufacturing, processing, labeling, and marketing of feed, fertilizer, seed, and raw milk. Our primary objectives are to protect consumers of these products from poor-quality, mislabeled, or misrepresented products and to protect businesses marketing these products from unfair competition.

Feed, fertilizer, and seed are monitored from ingredients through manufacturing and retail channels for compliance. Label review and product and facility inspections as well as product sampling by our inspectors and analysis in our laboratories are important steps in this process. Raw milk is monitored during marketing to (1) ensure accurate and equitable exchange between dairy producers and processors; and (2) ensure integrity of milk from farm to processor.

Eight regulatory inspectors and one auditor cover the state collecting samples, inspecting facilities, reviewing labels, and

auditing records. Audits of sales and fee payments are conducted on feed, fertilizer, seed, and milk firms in Kentucky to verify reports, records, and fee payments. One additional inspector is dedicated to the milk program for auditing payment records and monitoring activities of sampler-weighers, handlers, lab personnel, and lab facilities.

A dedicated and professional staff conduct laboratory analyses, provide administrative and computer support, process data, and compile reports in addition to various other duties necessary to carry out and administer effective programs.

Feed Regulatory Program

The feed regulatory program provides consumer protection for livestock feed and pet food according to provisions of the Kentucky Commercial Feed Law. The program ensures safety, suitability, and quality of animal feed in producing meat, milk, and eggs for human consumption and products for companion animals. The program provides standards of quality, safety, efficacy, and labeling for feed products. A statewide inspection, sampling, and laboratory analysis program monitors feed ingredients and feed products. Feed labels are evaluated to identify

purpose of feed, guaranteed composition, ingredient list, feeding directions, and the need for any warning or caution statements.

The feed program participates in food safety efforts that promote consumer confidence in the nation's food supply. We work cooperatively with the U.S. Food and Drug Administration (FDA) in assessing compliance with the ruminant-to-ruminant feeding ban to prevent any establishment or amplification of bovine spongiform encephalopathy (BSE or "mad cow disease").

Highlights

- Performed official inspections on 1,288 feed manufacturers and dealers.
- Collected 3,024 official and 133 unofficial samples that resulted in 20,347 lab analyses.
- Collected 1,002 pet food samples for analysis.
- Under our contract with FDA for the 2014–2015 fiscal year, inspectors will conduct a total of 79 inspections for compliance with the ruminant to ruminant feed ban, including 28 inspections of medicated feed mills for compliance with current good manufacturing practices.
- At the end of 2014, nearly 18,500 feed products were registered for sale in Kentucky, and approximately 3,000 of these products were approved in 2014.
- Analyzed and reported 41 feed samples from quality control programs.
- Used 47 different approved analytical methods in providing results.
- Income from inspection fees and product registration during the period of July 1, 2013, to June 30, 2014, was \$1,240,782.02. Inspection fees are assessed at \$0.35/ton, and annual registration fee of \$50.00 is collected for products sold exclusively in 10-pound or smaller packages.

Fertilizer Regulatory Program

The fertilizer regulatory program ensures Kentucky farmers and urban consumers of quality fertilizer while promoting fair and equitable competition among fertilizer manufacturers and dealers through inspection and analysis of products found in the marketplace. The Division, which administers and implements the Kentucky Fertilizer Law, promotes compliance through facility inspections, sampling, and analysis of fertilizer offered for sale. The law requires proper labeling of fertilizer, which includes the grade and guaranteed analysis of nutrients. The Division is also responsible for maintaining registration of fertilizer products.

Highlights

- Conducted 1,332 visits to perform inspections and to sample agricultural, lawn, turf, and garden fertilizer at Kentucky processing, wholesale, and retail locations.
- Administered actions on 2,775 official and 19 unofficial samples of fertilizer involving over 7,500 chemical tests.
- The official samples represented about 52,000 tons of the approximately 1,030,611 tons of fertilizer distributed in Kentucky during 2014, or about 5.03 percent.
- Reviewed labels and registered over 5,300 products from 536 firms and issued licenses to 172 companies that manufactured custom-blended fertilizers.

- Analyzed laboratory check sample materials from Magruder*, UAN, AFPC phosphate rock, AFPC phosphate, and AFPC specials for the fertilizer regulatory program.
- Provided support for 15 different analytical methods that yield results for 28 analytes and contaminants.
- Substantiated cash receivables from fertilizer reports. The income from registration fees, inspection fees, and licenses received from July 1, 2013, to June 30, 2014, was \$699,428. Fertilizer products are assessed an inspection fee of 50 cents/ton.

Milk Regulatory Program

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 dairy industry. Industry participants are trained, licensed, and subsequently monitored to maintain compliance with the law.

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

Highlights

- Reviewed applications and issued licenses to 2 transfer stations, 22 milk handlers, 16 laboratories, 75 technicians, and 306 sampler-weighers (milk-haulers, receivers, and samplers).
- Collaborated with Kentucky Cabinet for Health Services Milk Safety Branch to train sampler-weighers and processor receiving personnel. Trained and examined 19 new sampler-weighers and 7 new technicians.
- Conducted 10 pay-record and 13 raw milk receiving audits.
- Conducted 28 milk laboratory inspections.
- Conducted 368 sampler-weigher inspections and analyzed milk samples from 2,393 dairy herds to evaluate sampler-weigher performance and ensure accurate producer payments.
- Administered a monthly milk lab quality control check sample program through the distribution of 2376 samples to the 16 licensed laboratories and 2 other labs to ensure accurate component-analysis procedures.
- Provided analyses for university research projects pertaining to dairy cattle management and feeding practices effects on milk composition (135 samples analyzed).
- Provided analyses for Kentucky small processor cheese makers (168 samples).
- Analyzed milk samples from 72 cows in conjunction with cattle judging at North American International Livestock Exposition in Louisville.
- Income from fees and licenses received from July 1, 2013, to Jun 30, 2014, was \$171,051.00. Milk handlers and producers are assessed at the rate of one-half cent (\$0.005) per hundredweight of milk.

Seed Regulatory Program

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

Highlights

- Conducted 1,341 visits to perform inspections and to sample agricultural, lawn, turf, and garden seeds at Kentucky seed processing, wholesale, and retail locations.
- Collected and tested 2,059 official seed samples.
- Issued stop-sale orders on 224 official seed samples and 117 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 227 permits to label agricultural seed and 61 permits to label vegetable and flower seed.
- Registered 623 seed dealers and 25 non-certified custom seed conditioners.
- Provided training to firms on labeling requirements, retail sales procedures, stop-sale release procedures, and record keeping requirements.
- Substantiated cash receivables from seed reports. Income from fees, permits, and licenses received from July 1, 2013, to June 30, 2014, was \$451,869. Seed products are assessed at 8 to 24 cents per unit.

Seed Testing Laboratory

The Division maintains the only certified seed testing facility in Kentucky. This facility handles all official samples collected by inspectors and provides service testing for seed producers, dealers, retailers, research projects, and homeowners for a fee. More than 90 percent of the service samples accepted into the laboratory were submitted by Kentucky firms or individuals.

The laboratory analyzes seed for purity, identifies weed and crop seed, conducts germination, counts seed, determines test weight, performs accelerated aging, conducts fluorescence testing on ryegrass, determines moisture content, conducts tetrazo-

lium analysis, assesses herbicide tolerance, determines presence of endophyte, and conducts many other analyses. Our analysts keep abreast of changes through participation in regional and national referee testing with the Association of Official Seed Analysts (AOSA) and the USDA Federal Seed Laboratory and by attending special scheduled and regular workshops at the AOSA annual meeting. All analysts are AOSA-certified in areas of purity and germination.

Highlights

- Analyzed 3,365 service samples.
- Collaborated with researchers to analyze 58 seed samples.
- Supported the equine and livestock pasture management programs by analyzing 217 plant samples for endophytes.
- Analyzed 30 seed samples under the provision that allows one free sample for testing each year from Kentucky residents.
- Income derived from service samples from July 1, 2013, to June 30, 2014, was \$40,034.

Soil Testing Laboratory

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 program received \$236,203 in income for service testing during the period July 1, 2013, and June 30, 2014.

The soil test website is located at <http://soils.rs.uky.edu>. The number of samples analyzed in 2014 with the percent change from 2013 is shown below.

Soil samples analyzed

Type	Number	% Change
Agriculture	31,837	-3
Home lawn and garden	9,166	-7
Commercial horticulture	818	-17
Greenhouse media	44	-51
Research	6,999	0
Atrazine residue in soil	7	-83
Animal waste	494	-25
Nutrient solution	71	27
Soil nitrate	77	-21
TOTAL	49,513	-4

Robinson Center for Appalachian Resource Sustainability

At Quicksand in Breathitt County, the Robinson Center for Appalachian Resource Sustainability (RCARS) is the east region location for research on fruits and vegetables, ornamentals, livestock forage and grazing systems, grain crops, bio-mass crops, tobacco, and wood utilization. The Robinson Center is also the administrative headquarters of the Robinson Forest,

which spreads over parts of Breathitt, Perry, and Knott counties and is the site of forestry, wildlife, surface mine reclamation and watershed management research.

Established in 1925, the Robinson Center for Appalachian Resource Sustainability has the budgetary and physical responsibility for managing the research facilities at Quicksand, the

Wood Utilization Center, and Robinson Forest. The mission of this unit is to increase the long-term, value-added, sustainable income, and sustainable flow of economic, ecological, and social goods and services from the lands, natural resources, and people of Eastern Kentucky and the Appalachian Region.

Research Activities

Robinson Center (Quicksand)

Plant and Soil Sciences

- The RCARS is the east region location for the livestock forage variety testing program. Results from orchardgrass, tall fescue, and red clover trials are published annually.
- In a corn-liquid N fertilizer trial, evaluated a nitrification inhibitor product at two different times of N application and at two different N application rates. There was a strong response to improved N nutrition, but crop yield potential was reduced by a prolonged early period of dry weather. The inhibitor did positively impact N nutrition as measured by plant tissue N concentration but was not effective at raising grain yield.
- Evaluation of an experimental insecticide for control of aphids, flea beetles, hornworms, and budworms on burley tobacco. The product was found to have some efficacy against flea beetles and aphids, but did not last as long as currently registered products.

Plant Pathology

- Evaluation of experimental fungicides for foliar disease control on burley tobacco. An experimental, naturally derived compound was tested for efficacy against blue mold of tobacco. The compound was not found to be as effective as a currently registered plant resistance activator.
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Horticulture

- Hops variety trial. Funded by Kentucky Horticulture Council.
- Broccoli variety trial. Funded by Kentucky Horticulture Council.
- Rhubarb variety trial. Funded by Kentucky Specialty Crop Block Grant.
- Primocane bearing black raspberry variety evaluation. Funded by Kentucky Horticulture Council/gifts in kind from Nourse Farms/Peter Tallman—Niwot.
- Hybrid filbert variety trial in collaboration with Kentucky State University and Dr. Kirk Pomper
- Fresh Market cabbage. Funded by Kentucky Horticulture Council.
- Pumpkin variety trial. Funded by Kentucky Horticulture Council.
- High tunnel vegetable production systems. This study monitors soil and ambient air temperatures, soil moisture availability and water usage in a low pressure trickle irrigation system for early spring tomato and late fall kale and collards production.

Robinson Forest

Entomology

- Research continues on the effects of the highly invasive hemlock woolly adelgid on headwater streams and associated riparian zones, including stream characteristics, terrestrial and benthic riparian macroinvertebrate communities, litter fall, and litter colonization.
- A common garden of six hemlock species of varying geographic origin is being used to evaluate hemlock woolly adelgid behavior ecology, including potential species-specific differences in host suitability and physiological effect of adelgid colonization.

Biosystems and Engineering

- The Guy Cove Stream Restoration Project: Recreating a headwater stream system on a head-of-hollow fill
- Specific conductivity sensor performance study under controlled conditions to evaluate sensor accuracy

Geography

- Changes in a soil microbial community following a tree throw

Forestry

- Evaluating the effect of canopy structure and openness on Plethodontid salamander species abundance and richness.
- Are elk vectors of invasive plant species? This study seeks to determine if elk through herbivory are vectors of invasive plant species.
- Restoring forest wildlife habitat on reclaimed mined lands. This project will re-establish a hardwood forest by de-compacting mine spoil and removal of invasive species to improve cerulean warbler habitat.
- Spatial ecology and den use by the eastern timber rattlesnake in mining associated habitat in central Appalachia forest.
- Effects of regeneration opening size and simulated crop tree release on volume yields and economic value in oak-dominated stands.
- Effect of timber harvest on invasive species colonization relative to disturbance, site and soil conditions.
- Resource selection, survival and cause-specific mortality in cow elk in southeast Kentucky. Radio-collared cow and bull elk are studied to determine dominance behavior and hierarchies that may influence disease transmission.
- Effects of timber harvest on breeding bird communities in a mixed mesophytic forest.
- Factors controlling carbon distribution on reforested mine-lands and regenerating clear cuts in Appalachia.
- Evaluating best management practices for ephemeral channel protection following forest harvest in the Cumberland Plateau.
- Effects of riparian zone width and disturbance on water quality and stream communities following forest harvest in eastern Kentucky watersheds.
- Development and deployment of a bioreactor for the removal of sulfate and manganese from circumneutral coal mine drainage.
- Evaluating reforestation success on a surface mine in eastern Kentucky.

- Evaluating the use of Light Detection and Ranging (LiDAR) information to improve forest management decisions.
- Long-term hydrologic monitoring of Cumberland Plateau headwater streams at Robinson Forest.
- Effect of size of opening and cultural treatment on reproduction in oak-hickory stands in eastern Kentucky.
- Crop tree release of small saw timber white oak on the Cumberland Plateau.
- Development of a rapid assessment model for measuring stream function using Hydrogeomorphic (HGM) Approach to ecosystem assessment.

Kansas State University

- Continental Nitrogen. This study addresses continental-scale questions related to trends in N availability through time, and the relationship between forest carbon and nitrogen dynamics.

U.S. Environmental Protection Agency

- Characterizing macroinvertebrate drift and organic matter transport in headwater streams. This study investigates macroinvertebrate assemblages in unmined and mined streams.
- Morphological divergence in *Etheostoma pilotum* Gilbert (Kentucky arrow darter) along a stream gradient with known barriers, both natural and anthropogenic.

U.S. Department of Fish and Wildlife

- Population estimation and microhabitat characterization of *Etheostoma pilotum* Gilbert (Kentucky arrow darter) in Clemons Fork, Breathitt County, Kentucky.

U.S. Army Corps of Engineers

- Development of a rapid assessment model for measuring stream function using the hydrogeomorphic (HGM) approach to ecosystem assessment.

Extension Activities

- USDA Forest Service, National Forest Silviculture Certification Training. March.
- Military Family Camp at Robinson Forest. June.
- Win With Wood Youth Event. October.
- Mountain Ag Week. September 23–27.
- Forestry Research tour at Robinson Forest as part of Mountain Ag Week.
- Kentucky Forestry Best Management Practices Board review of timber harvesting streamside management zone practices on water quality. October.
- Pickin' Time Mountain Music and Harvest Day Festival. November 1.
- University of Kentucky's Department of Forestry at the Robinson Center partners with the Division of Forestry in creating and maintaining a Wood Industries Directory of all the wood product companies in the state.
- UK Wood Utilization Center Entrepreneur Development Program. Entrepreneurs are currently participating in this program to develop new wood products businesses.
- Mountain Monday Series. Monthly extension programs on a variety of topics are held at the RCARS the second Monday of each month.
- 4-H Natural Resource and Environmental Sciences Academy. A three-year program for seventh and eighth graders based on their academic achievements and teacher recommendations. Students study water, forestry, and wildlife resources at the Robinson Forest.
- Farmer's Market educational program.

Teaching Activities Conducted at Robinson Forest

- NRE 320—Natural Resources and Environmental Analysis
- FOR 356—Landscape Assessment
- FOR 357—Inventory and Measurements II
- FOR 358—Silviculture Practices
- FOR 359—Forest Operations and Utilization

UK Ag Equine Programs

UK Ag Equine Programs is an interdisciplinary program encompassing all three areas of the land-grant mission: teaching, research, and outreach. A brief review of 2014 activities in each area follows.

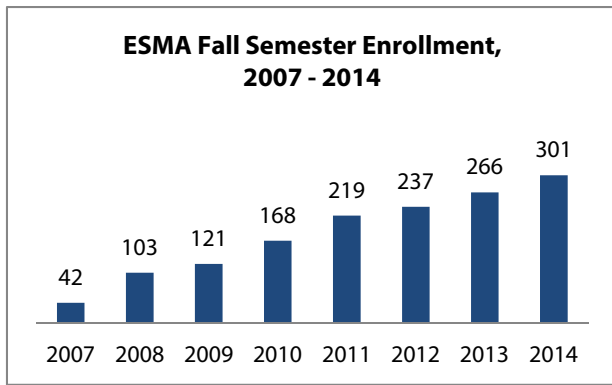
Leadership and Organization

The Equine Programs Affiliates program was launched in August 2014 to formally identify those individuals at UK involved in equine-related teaching, research, outreach, advising, communications, and support and to create a listing and foster a community among those individuals. In addition to these benefits, the EP Affiliate program will demonstrate the breadth of the multidisciplinary program among college and university administration. To date, 26 faculty and 18 staff have formally identified themselves as being EP affiliates.

Teaching

The Equine Science and Management (ESMA) undergraduate degree was officially instituted in 2009, but even before that, 42 students were enrolled in "Individualized Studies," pending official approval of the program. In fall 2014, enrollment had climbed to 301 students. About 32 percent of these students are in state. Out-of-state students represent 33 states and the District of Columbia, and six international students are enrolled. Females account for 86 percent of the students currently enrolled. The figure on the following page shows the continued rapid growth in enrollment.

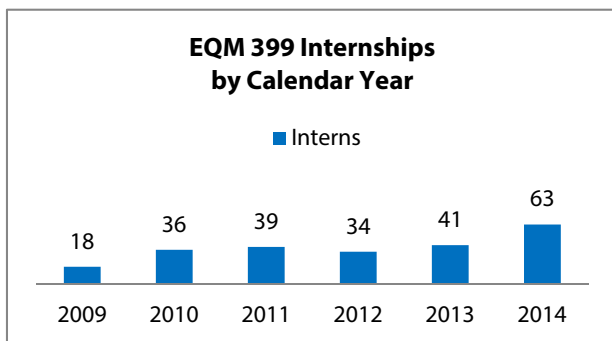
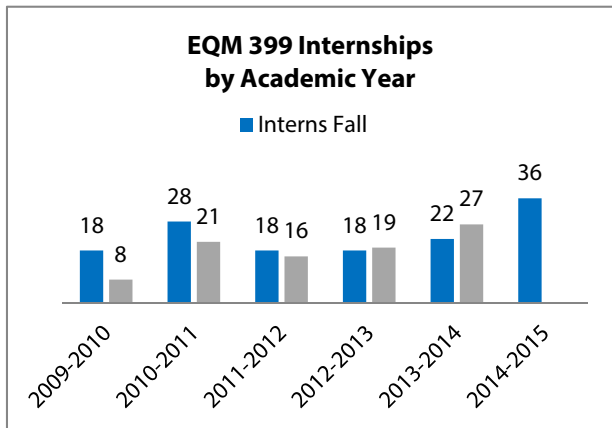
A curriculum revision was approved in May 2014. Rather than choosing from two options (science or management), students may now choose up to two areas of emphasis from the following: science, business/industry, community leadership and development, and pasture and forage management.



The undergrad degree program also underwent its first external program review. These reviews are required by the Council of Post-Secondary Education and happen every five to seven years. The external review committee's report was overwhelmingly positive and urged greater investment, both internal and external, to catch up to the growth in the program.

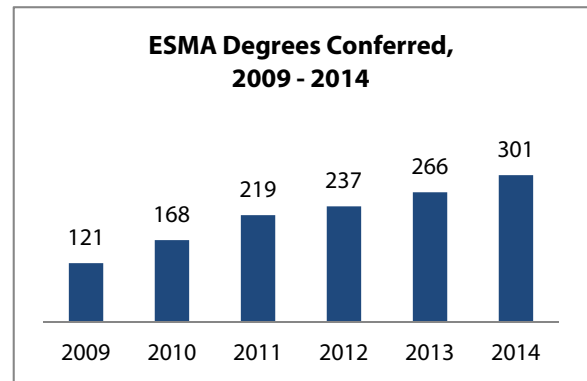
Internship Program

ESMA students completed 63 internships, or 1.5 times the number of internships completed in 2013. Fifty-four internships were in Kentucky, five were out of state, and two were international.



Alumni

The ESMA program has conferred degrees to 135 graduates to date. Number of degrees conferred by calendar year is illustrated in the following figure:



In exit surveys conducted with these graduates, 76 percent of respondents indicated that they were currently employed in equine industry, 19 percent were pursuing further training, and 5 percent were employed outside industry. The response rate was 76 percent.

Research

Currently, 20 EP affiliates, along with their approximately 40 graduate students, are involved in equine-related research within the UK Ag Equine Programs. Areas of research represented within the UK Ag Equine Programs include:

- Economics
- Entomology
- Environmental stewardship
- Genetics and genomics
- Horse-human connection
- Immunology
- Infectious diseases
- Musculoskeletal science
- Nutrition
- Parasitology
- Pasture management
- Reproductive health

Outreach

UK Ag Equine Programs offers a rich set of outreach programs, including adult and youth extension programming as well as a variety of other programs.

Adult Extension Programs

- Horse College attracted more than 60 participants from nine counties across the state.
- Farm and Facilities Expo in Jessamine County attracted about 220 participants.
- Farm and Facilities Expo in Calloway County, the second field day held in western Kentucky, attracted 72 participants from six counties.
- Asbury Draft Horse Field Day, held in partnership with Asbury University, attracted about 250 participants.

Youth Extension Programs

The Kentucky 4-H Horse Program delivers educational programs to youth and adult leaders and volunteers across the state. There are 5,000 total youth registered in the Kentucky 4-H

Horse Program. Some of the activities include:

- State 4-H Horse Show attracted 650 youth.
- State 4-H Horse Program Contest attracted more than 350 youth.
- Leader Certification Program certified 50 leaders.

In addition to extension programming, UK's Ag Equine Programs offers a variety of other outreach programs, including:

- Diagnostic Services by UK's Veterinary Diagnostic Laboratory (VDL): nearly 12,000 EVA tests, nearly 21,000 EIA tests, and more than 1,400 necropsies. The VDL offers testing and consulting in the following fields:
 - Microbiology
 - Molecular biology
 - Histopathology
 - Clinical pathology
 - Serology/immunology
 - Toxicology
 - Virology
 - Epidemiology
- Department of Veterinary Science Equine Diagnostic and Research Seminar Series offers monthly seminars attracting internal and external participants; recorded by *The Horse* and made available internationally.
- Horse Pasture Evaluation Program performed 17 evaluations on 2,000 acres and 6,600 farm acres in seven counties.
- Pastures Please was held in Scott County and attracted about 150 participants.
- UK Equine Research Showcase and UK Breeders' Short Course attracted approximately 135 total participants from five states.

Communications

Twenty equine-related news releases were produced by EP Communications or the College of Agriculture, Food and Environment. In addition, communications support was provided to the 14 EP hosted or attended events.

The program's printed and display materials were updated and a new website was begun. In addition the program is active on Facebook and has added a Twitter account.

Two monthly online newsletters are produced within the Equine Programs office, including the *Bluegrass Equine Digest*, with nearly 30,000 subscribers from 50 states and 110 countries and click-through/open rates around 30 percent, among highest of *The Horse's* e-newsletters. The *Bluegrass Equine Digest* was also recognized as the top e-newsletter in its category by American Horse Publications. The *Wildcat Canter*, a student and program based e-newsletter, continues to grow and also won awards through the local chapter of the Public Relations Society of America. Other equine-related newsletters in the college include *Equine Disease Quarterly*, *Equine Research and Service Report*, and *Board Bits* from the Gluck Center.

Advertisements were placed in the Kentucky Thoroughbred Farm Managers' Club annual directory and Kentucky Forward.

Clubs and Teams

Equine clubs and teams continue to be popular, in particular the Dressage and Eventing Team, Equestrian Team (western and hunt seat), Horse Racing Club, Polo Team, Research in Equine and Agricultural Disciplines Club, Rodeo Team (which is now a member of the National Intercollegiate Rodeo Association), and Saddle Seat Team.

UK Research and Education Center at Princeton

UK Research and Education Center at Princeton

The University of Kentucky Research and Education Center (UKREC) holds a unique position as part of the Kentucky Agricultural Experiment Station and the Kentucky Cooperative Extension Service and remains dedicated to sustaining the heritage of impact and achievement by these great institutions and the rapidly changing issues and challenges associated with them. Its vision is to be recognized at the local, state, and national level for excellence in agricultural research, education, leadership, and service to the Commonwealth.

Established in 1925, the West Kentucky Substation at Princeton has functioned as a center of agricultural activities in western Kentucky. Great advancements have been made in Kentucky's leading industry—agriculture—with considerable progress being made in improving use and conservation resources, increasing yields of crops and livestock, better management of capital and labor, expanding markets, and finding solutions for problems facing rural people and communities. Increased returns to Kentucky farmers and livestock producers total millions of dollars annually just from the use of new production technologies resulting from research findings and educational programs of the College of Agriculture, Food and Environment.

The University of Kentucky Research and Education Center is fundamentally interdisciplinary, applying the biological and social sciences to challenges in agricultural, food, and environmental systems. Our scholarship encompasses human and natural resources and their interaction.

As part of the University of Kentucky, the Center:

- Facilitates life-long learning, informed by scholarship and research
- Expands knowledge through creative research and discovery
- Serves Kentucky communities by disseminating, sharing, and applying knowledge

The UKREC is the headquarters for more than 50 faculty and staff members representing seven different academic departments (Agricultural Economics, Animal and Food Sciences, Biosystems and Agricultural Engineering, Entomology, Horticulture, Plant and Soil Sciences, and Plant Pathology) and three units (Ag Communications Services, Research and Education Center, and Regulatory Services) in the College. Its faculty and staff conduct research, provide diagnostic testing services, and develop educational programs on topics of concern to Kentucky farmers, livestock producers, agribusinesses, and families.

The UKREC Experiment Station Farm consists of almost 1,300 acres, including soils of both sandstone and limestone

origins that are characteristic of soil types throughout the state. Researchers conduct approximately 100 different research/demonstration projects each year at the Experiment Station Farm or on farms in western Kentucky. Information derived from these projects or research conducted elsewhere is delivered to farmers, livestock producers, and the general public through county offices of the Cooperative Extension Service. Extension specialists located at the Center have expertise in a wide variety of food and agriculture topics.

Crops such as corn, wheat, soybeans, tobacco, fruit, vegetables, and ornamentals are studied for ways to increase yields and income, improve handling and storage, protect the environment, and address other problems farmers may have. Research, demonstrations, and educational programs are also conducted in the areas of beef and swine production. Agricultural engineering specialists conduct research and educational programs related to both crop and livestock production. In addition, an aquaculture program is conducted in cooperation with Kentucky State University.

Service laboratories located at the Center provide information needed to make management decisions in the following areas:

- Soil testing enables farmers to develop nutrient management plans for growing crops.
- The plant disease diagnostic laboratory helps identify plant health problems and provides recommendations for disease prevention and control. Once insect and plant pests are identified, specialists can give advice on integrated pest management strategies to control them.

The manager for Extension Information Technology Support for Cooperative Extension has been based at the UKREC since 2006. This position provides leadership for the Extension IT unit and directs all state projects from Princeton. Work is focused on electronic services VoIP systems, data communications and processing, project management, remote and data center operations, policy development, and customer service. The IT Manager for Extension supports six IT professionals who provide onsite and remote support, training, and development as well as maintain the overall IT infrastructure for the 120-county extension offices in Kentucky.

The following additional learning opportunities and resources are provided through the UKREC:

- The Rottering-Kuegel Agricultural Research and Extension Building is available to large and small groups for classes and meetings in agriculture, home economics, and 4-H. It is also used for a wide variety of meetings by government agencies, industry, and the general public. Each year there are approximately 450 different meetings held in this building, attended by about 14,000 people, many from other states and countries.
- Commodity-specific and joint commodity field days showcase the work of the UKREC and attract about 3,000 people annually. Visitors observe research, educational displays, and demonstrations representing work conducted at the Center and throughout the state.

- Individuals and small groups are welcome to visit throughout the year to observe specific projects and talk with specialists.

Research Activities

Animal and Food Sciences—Beef Cattle

- Long-term effects of form of selenium on multigenerational physiological capacity
- Year-round mineral intake in beef cattle
- Performance of Wagyu or Angus steers in the feedlot

Animal and Food Sciences—Swine

- Evaluation of within-production facility (under-slat) manure composting for finishing swine
- Evaluation of liquid-solid separation system for nursery and finishing swine
- Evaluation of an automated “compost-a-matic” system for composting manure from a swine wean-to-finish operation
- Evaluation of composting of separated swine manure solids with wood chips
- Evaluation of an under-slat scraper system for removing solid manure from a swine wean-to-finish facility

Biosystems and Agricultural Engineering

- Improving energy efficiency on Kentucky farms
- Evaluation of a wood pellet heating system for broiler houses
- Energy assessments for grain and livestock farms
- Energy assessments for solar PV installations
- Nationwide study on packing factors of six different grains
- Providing food security in Nigeria by reducing post-harvest losses of grains during storage at the farm and small-holder (warehouse) level
- Assessment of needed research and Extension programs in Ghana to reduce post-harvest losses of grains along the value chain
- Revising the *Midwest Plan Service Handbook on Grain Drying, Handling and Storage*

Entomology

- Using insect pheromone traps to predict outbreaks
- Survey of exotic insects in soybeans, corn, wheat and orchards
- Spotted wing drosophila survey in small fruit

Forages

- Alfalfa variety test
- Red clover variety test
- Tall fescue variety test
- Orchardgrass variety test

Grain Crops

- No-till wheat management
- Corn variety trial
- Wheat variety trials (2)
- Soybean variety trial
- Testing of wheat breeding lines
- Wheat fusarium head blight nursery
- Canola variety trial
- High-input soybean trial
- Low-input corn trial

- Wheat plant growth regulator trial
- Wheat vernalization trial
- Wheat seed treatment trial
- Wheat fungicide trials
- Soybean fungicide trials
- Corn seed treatment trial
- Evaluation of Palisade plant growth regulator and nitrogen rates on wheat growth and yield

Horticulture—Sustainable Nursery/Landscape Research

- Integrated pest management (IPM) monitoring
- Drone nursery plant health and pest monitoring
- Programmable logic controller (PLC) irrigation controller design and evaluation
- Maintaining water quality and efficient irrigation of nursery crops
- Landscape plant evaluations
- Landscape plant establishment based on production container
- Plantable container evaluation for sustainable production
- Efficient fertilization of nursery crops
- Kentucky native plant evaluation, production protocols, and use
- Development and maintenance of Kentucky provenance stock plants
- Container nursery runoff remediation

Horticulture—Fruit

- Rootstock trials: apple and peach
- Cultivar trials: peach, wine grape and blackberry
- Small fruit demonstration plots
- Pecan variety demonstration
- Blueberry fruit production in aboveground containers with programmable logic controller (PLC) irrigation and fertility monitoring and control

Manure Management and Use

- Poultry litter, biosolids, and composted swine manure used for winter wheat production (cooperative study with ARS-AWMRU)
- Poultry litter use for corn and soybean production
- The use of gypsum and/or poultry litter to increase rooting depths in fragipan soils
- Investigation of the potential of poultry litter to contain viable weed seed

Plant Pathology

- Soybean fungicide efficacy testing
- Wheat fungicide efficacy testing
- Effect of poultry litter on soybean cyst nematode populations
- Soybean rust monitoring
- Soybean vein necrosis-associated virus seed transmission studies, in cooperation with the University of Tennessee

Soils

- Greenhouse trials examining the effects of wheat, ryegrass, sodium fluoride, sodium nitrate, and sodium chloride on the fragipan

- Field trials examining the effect of wheat, ryegrass, sodium fluoride, and sodium nitrate on the fragipan
- Poultry litter, biosolids, and composted swine manure used for winter wheat production, in cooperation with ARS-AWMRU
- Poultry litter use for corn and soybean production
- The use of gypsum and/or poultry litter to increase rooting depths in fragipan soils
- Potential nitrogen loss in wheat with frozen soil applications

Tobacco

- Dark fire-cured commercial variety test
- Dark air-cured commercial variety test
- Burley commercial variety test
- Burley regional quality trial
- Tobacco transplant production management
- Insecticide performance for tobacco hornworm, budworm, and aphid control
- Evaluation of C10 fatty alcohols for tobacco sucker control
- Foliar fungicide performance for blue mold and target spot control in burley tobacco
- Dark fire-cured and dark air-cured tobacco pesticide residue tests
- Effect of preharvest ethephon application on yellowing and nitrosamine production in dark-fired tobacco
- Effect of crop maturity on nitrosamine production in dark-fired tobacco

Weed Science

- Marestalk efficacy using burndown followed by foliar-applied herbicides in non-crop fallow
- Comparing different ALS-inhibitor herbicides for managing weeds in soybeans
- Comparing Fierce XLT, Authority XL, and Envive in Round-up Ready soybeans
- Comparing authority brands with certain other preemergence herbicides in soybeans
- Grass and broadleaf weed control with authority brand herbicides in soybean
- Soybean response to preplant applications of dicamba
- Residual marestalk control in a fallow system
- Enhanced degradation of atrazine from soils collected in Warren County
- Comparing different ALS-inhibitor herbicides for managing weeds in corn (2 studies at UKREC)
- Weed control programs in corn using Fierce
- Common chickweed control in wheat (one study at UKREC and one in Christian County)
- Italian ryegrass control in wheat using pre- and post-emergence herbicide programs
- Effect of Axiom and other herbicides on Italian ryegrass control and wheat injury
- Italian ryegrass and broadleaf weed control in wheat using F-9312-3 and other herbicides
- Italian ryegrass control in wheat using Fierce and Valor
- Tolerance of Clearfield canola to Beyond

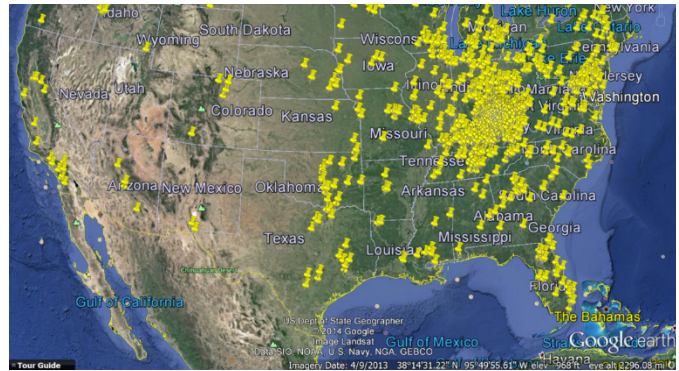
UK Veterinary Diagnostic Laboratory

Overview

The University of Kentucky Veterinary Diagnostic Laboratory (UKVDL) strives to be one of the premier veterinary diagnostic laboratories in the United States, providing timely and accurate services in support of the practicing veterinary profession, Kentucky animal agriculture, the signature equine industries, companion animals, and public health. As the state's flagship veterinary diagnostic laboratory, the University of Kentucky Veterinary Diagnostic Laboratory's primary goal is to develop, apply, and utilize state-of-the-art veterinary diagnostic testing methods and scientific knowledge to improve animal health and marketability, preserve the human-animal bond, and help protect and improve public health through the early and accurate identification of zoonotic diseases. The UKVDL laboratory is fully accredited by the American Association of Veterinary Laboratory Diagnosticians (AAVLD) and is a member of the USDA National Animal Health Laboratory Network (NAHLN) and the FDA Veterinary Laboratory Investigation Response Network (Vet-LIRN).

In addition to its clinical diagnostic role, the UKVDL provides surveillance and regulatory testing for emerging and endemic diseases such as equine infectious anemia (EIA), equine viral arteritis, equine piroplasmiasis, West Nile virus, chronic wasting disease of deer, contagious equine metritis, bovine spongiform encephalitis (mad cow disease), Johne's disease, bovine leukosis, avian influenza, rabies, and many other diseases of agricultural, public health, and companion animal importance. Furthermore, the laboratory is always on the watch for the emergence of foreign animal diseases (FADs) such as foot and mouth disease and classical swine fever. As part of the NAHLN, the UKVDL conducts ongoing proficiency testing (PT) to be prepared for any outbreak of a FAD in Kentucky and to assist other states as needed. The laboratory is composed of fifteen distinct sections as depicted in the following organizational chart.

Farmers and animal owners use the UKVDL's services primarily through their practicing veterinarians. These professionals have expertise in selecting, preparing, shipping, and submitting the proper specimens for testing when needed to assist in making a clinical diagnosis. Laboratory findings are reported back to the submitting veterinarian, who then consults with his or her clients to implement a treatment protocol or a prevention/management solution to disease problems on the farm. A state-of-the-art labora-

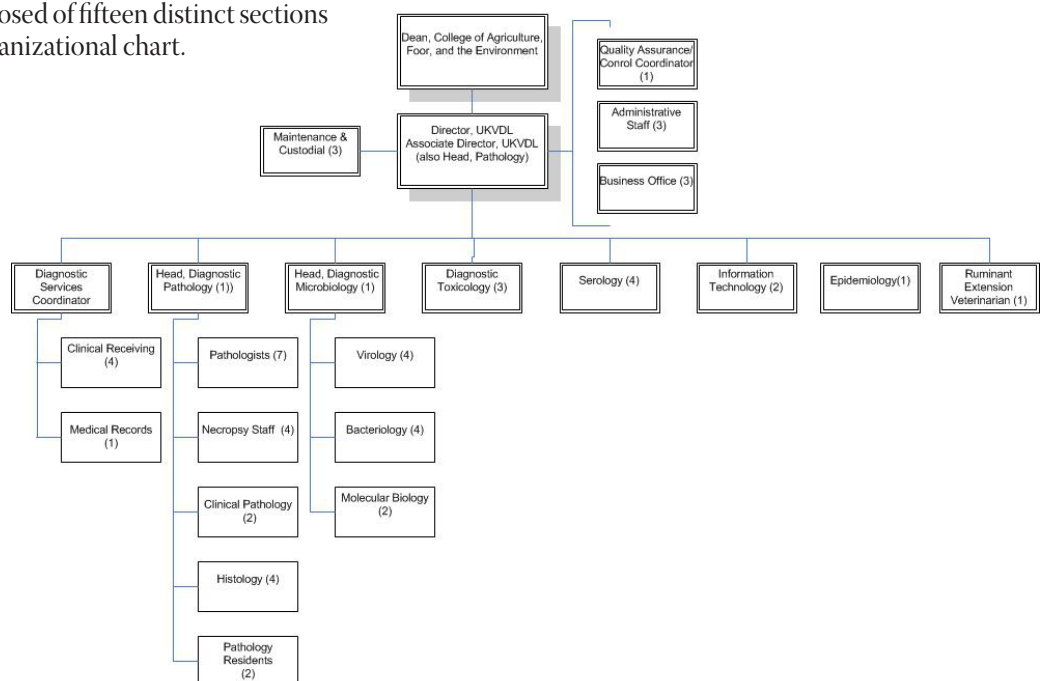


Locations of clients submitting accessions to UKVDL, 2009–2014

tory information management system (LIMS) is utilized at the UKVDL which enables UKVDL to provide the most professional, accurate, and timely accessioning, order entry, results capture, and clinical case reporting for our clients.

UKVDL faculty, scientists, and technical staff are specialists in several diagnostic medical disciplines directly related to animal health, including bacteriology, clinical pathology, epidemiology, extension, molecular biology, pathology, serology, toxicology, virology, and informatics. Funding to add metagenomics testing is being pursued to improve diagnostics in the future. The laboratory is also exploring the potential of supporting the Kentucky aquaculture industries, food safety, stem cell therapy, and other emerging animal health technologies. Disease diagnostic

UK Veterinary Diagnostic Laboratory
Organizational Structure (June, 2014)



efforts are coordinated and handled by specialists in the appropriate disciplines. Complex clinical cases involving multiple sections are monitored by trained case coordinators. During surge testing periods and disease outbreaks, trained technicians are redistributed across sections to assure that the surge in workload can be managed in a timely and accurate fashion.

The UKVDL received 12,976 clinical diagnostic cases and 28,142 regulatory cases in calendar year 2014. Regulatory cases are down about 10 percent from 2013. This downward trend is due primarily to a decline in state's requirements for equine piroplasmosis testing and the growing number of commercial laboratories approved to run equine infectious anemia testing, causing fewer samples to be submitted to UKVDL. However, the clinical diagnostic and necropsy caseloads are holding fairly steady. The diagnostic and necropsy accession loads fluctuate in a secular manner relating to disease outbreaks. Total tests run in each laboratory section are listed in the individual section reports.

Necropsy Animals by Species

Species	# Animals
	25
Alpaca	14
Antilopine Kangaroo	1
Bobcat	1
Bovine	918
Canine	263
Caprine	84
Caribou	1
Chicken	59
Chinchilla	1
Cockatiel	2
Coyote	2
Deer	2
Donkey	2
Duck	1
Elk	2
Equine	1463
Feline	117
Fox	6
Hamster	3
Llama	3
Mouse	62
Ovine	65
Peacock	1
Pigeon	1
Porcine	32
Quail	6
Rabbit	1
Raccoon	71
Rat	38
Ringnecked Parakeet	3
Squirrel	1
Yak	1
	3227

Vision

The Veterinary Diagnostic Laboratory strives to be one of the premier veterinary diagnostic laboratories in the United States, providing the very best and most timely services in support of the practicing veterinary profession, Kentucky animal agriculture, the signature equine industries, companion animals, and public health.

The Veterinary Diagnostic Laboratory (UKVDL) is a full-service laboratory and an administrative unit in the College of Agriculture, Food and the Environment (CAFE) at the University of Kentucky. The UKVDL was established in 1970 by the state legislature of Kentucky and charged with the responsibility of provision of diagnostic assistance to veterinary practitioners, owners of animals in Kentucky, wildlife conservationists, scientists utilizing animals in their research throughout the university, and state-federal regulatory officials. The laboratory assists with safeguarding the health of animal agriculture in Kentucky via diagnostic testing and disease identification. The UKVDL identifies infectious and parasitic diseases and chemical and other toxic contaminants that may harm animals or humans, diagnoses nutritional disease, identifies regulatory diseases, provides the means to meet export sales requirements, and provides an early warning system for impending epidemics. Emphasis is placed on quality assurance and control for all diagnostic and regulatory testing, including new testing methods. Each employee of the UKVDL focuses on performance of all tasks according to protocol and with commitment to quality.

Mission

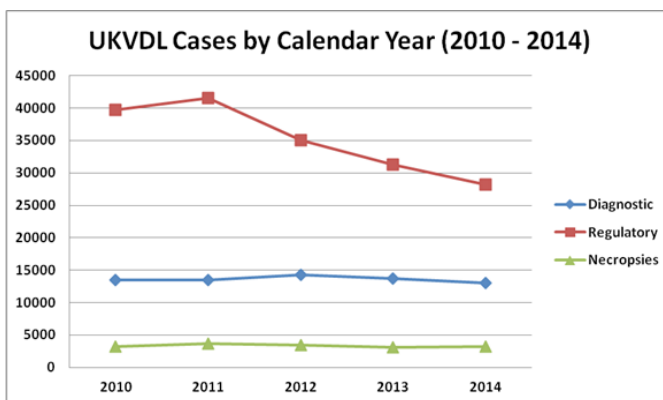
The UK Veterinary Diagnostic Laboratory's primary goal is to develop, apply, and utilize state-of-the-art technology and scientific knowledge to improve animal health and marketability, preserve the human-animal bond, and help protect the public health.

Quality Philosophy and Objectives

Every employee of the UKVDL is committed to quality, integrity, and excellence in all work completed. To meet our mission and achieve our vision, we must:

- Ensure client satisfaction by consistently meeting or exceeding customer requirements
- Demonstrate competence in accordance with AAVLD essential requirements through the performance of high-quality diagnostic testing in accordance with ISO 17025 standards and guidelines
- Continuously improve diagnostic information and dissemination processes
- Integrate contemporary laboratory practices throughout the laboratories
- Ensure employee health and safety
- Provide employees with training and tools to facilitate our quality effort

The laboratory's success is measured by customer satisfaction, by meeting professional standards and the essential American Association of Veterinary Laboratory Diagnosticians (AAVLD) accreditation requirements, and response to service demands. These quality objectives are reviewed for continuing compliance on a recurring basis.



Year	Diagnostic	Change	Regulatory	Change	Necropsies	Change
2010	13487		39705		3172	
2011	13491	0.03%	41538	4.62%	3645	14.91%
2012	14227	5.46%	35093	-15.52%	3398	-6.78%
2013	13655	-4.02%	31251	-10.95%	3100	-8.77%
2014	12976	-4.97%	28142	-9.95%	3227	4.10%

Outreach

The UKVDL continues to build and enhance outreach programs throughout Kentucky. The Kentucky VetLabNet listserv continues to distribute animal health bulletins and the list of recipients has grown to more than 600 UKVDL clients, scientists, farmers, and stakeholders. The UKVDL director continues to contribute articles quarterly to the KVMA journal and the Kentucky Cattleman Association Cow Country News. The UKVDL director, faculty, and staff continue to deliver lectures at scientific and lay meetings and participate in the monthly Equine Diagnostic-Research Seminar Series at the UKVDL since 2006. These seminars are filmed by *The Horse* magazine, edited, and made available as webinars. They have been viewed in over sixty countries:

Other Outreach Events (Select)

- Food Animal Practitioner Conference, attended by 50 veterinarians and other guests. February 26.
- Poultry Symposium, attended by 43 veterinarians and other guests, including a necropsy demonstration. May 30–31.
- The director presented “A Memoriam for Dr. James H. Steele—One Health Leader” at the J.V. Irons Luncheon at the Diseases in Nature Conference, Irving, TX. June 27.
- Food Animal Practitioner Conference, attended by 47 veterinarians and other guests. August 14.
- The Life and Career of Dr. James Steele: Contributions to Veterinary Public Health and One Health. Presentation, American Veterinary History Society, 40th Mid-America Veterinary Conference, Galt House Hotel, Louisville, KY. September 28.
- The director and six UKVDL employees attended the AAVLD meeting in Kansas City, KS for continuing education and delivering scientific presentations.
- The director presented “Animal Health, Human Health, One Health: The Life and Legacy of Dr. James H. Steele” to the commemorative session for James H. Steele at the American Public Health Association annual meeting, New Orleans, LA. November 17.
- The director was invited to attend the executor director’s planning workshop for International Educational Meetings in support of the World Association of Veterinary Laboratory Diagnosticians, Cape Town, South Africa. December 8–12.
- See the Ruminant Extension Veterinarian and Epidemiologist’s reports below for additional outreach activities.

Major Disease Outbreak Responses (select)

- Confirmed diagnosis of EHV-1, leptospiral, and other etiologies in equine abortion cases
- Confirmed selenium/copper deficiencies leading to multiple abortion outbreaks in goats
- Confirmed diagnoses of *Mannheimia* related pneumonia and deaths in multiple cattle outbreaks
- Confirmed diagnoses of bovine viral diarrhea and deaths in multiple outbreaks
- Confirmed lesions of polioencephalomalacia in multiple goat deaths
- Confirmed diagnoses of Mycoplasma-related pneumonia and high mortality in cattle in multiple outbreaks

UK DEPARTMENT OF VETERINARY SCIENCE
EQUINE DIAGNOSTIC AND RESEARCH
2014 Seminar Series
UK Veterinary Diagnostic Laboratory Auditorium
1490 Bull Lea Road, Lexington, KY

January 30 4:00 pm

Inflammatory airway disease—Laurent Couetil, Purdue University; Pierre Lavoie, University of Montreal

February 7 1:00 - 5:30 pm

UK Equine Showcase—Multiple speakers; A program highlighting the university’s current equine programs and findings relevant to the industry. Location: The Four Points by Sheraton

February 8 8:00 am - 5:00 pm

Kentucky Breeders’ Short Course—Multiple speakers; An in-depth program on equine reproduction and horse management issues. Location: The Four Points by Sheraton

February 27 3:30 - 5:30 pm

Hot topics in equine reproduction presented at the 11th *International Symposium on Equine Reproduction (ISER)* in New Zealand—Barry Ed Squires and Mats Troedsson, UK Gluck Equine Research Center

No seminars in March, April or May

June 19 4:00 pm

Equine welfare—Tom Lenz, Zoetis

July 31 4:00 pm

Foot—Debra Taylor, Auburn University

August 28 4:00 pm

Foal diseases—Pam Wilkins, University of Illinois

September 25 3:30 - 5:30 pm

Equine Herpes Virus-1 (EHV-1)—Steve Reed, Rood and Riddle Equin Hospital; and Udeni Balasuriya and Peter Timoney, UK Gluck Equin Research Center

October 20 1:30 - 5:00 pm

Racetrack Breakdown Symposium—Mary Scollay, Kentucky Racing Commission; David Horohov, UK Gluck Equine Research Center; and John Pelosa, Equine Medical Center of Ocala

November 20 4:00 pm

Shock wave therapy—Scott McClure, Iowa State University

For more information: (859) 218-1089

jenny.evans@uky.edu

- Confirmed lesions of suppurative and histiocytic meningoencephalitis and ventriculitis and deaths in puppies in multiple outbreaks
- Confirmed diagnoses of clostridial enteritis and abomasitis and deaths in cattle in multiple outbreaks
- Confirmed diagnoses of parvoviral enteritis and deaths in dogs in multiple outbreaks
- Confirmed diagnoses of feline panleukopenia and feline infectious peritonitis and deaths in cats in multiple outbreaks
- Confirmed diagnoses of bronchopneumonia due to *Pasteurella multocida* and deaths in cattle in multiple outbreaks
- Confirmed diagnoses of necrotizing enterocolitis of mixed causes to include cryptosporidiosis and a variety of bacterial and viral pathogens and high mortality in cattle in multiple outbreaks
- Presumptive diagnoses of malnutrition in calves and grown cattle with high mortality in multiple incidents
- Confirmed diagnoses of arsenic toxicosis in cattle with high mortality in multiple outbreaks
- Confirmed diagnoses of anticoagulant rodenticide intoxication and death in dogs in multiple incidents
- Confirmed diagnoses of moxidectin intoxication and death in foals in multiple incidents
- Confirmed diagnoses of pyrimethamine intoxication and death in horses in multiple incidents

- Confirmed diagnoses of lead intoxication and death in cattle in multiple incidents
- Confirmed diagnoses of ethylene glycol intoxication and death in dogs in multiple incidents
- Confirmed diagnoses of botulism and death in foals in multiple incidents
- Suspected diagnoses of sodium intoxication and death in cattle in multiple incidents
- Confirmed diagnoses of copper poisoning and deaths in sheep
- Confirmed diagnosis of monensin intoxication in cattle
- Confirmed diagnoses of taxus poisoning and deaths in cattle in multiple incidents
- Confirmed diagnosis of nitrate/nitrite poisoning and deaths in cattle in multiple incidents

Notable achievements or advancements

- Director continues to serve as executive director of the World Association of Veterinary Laboratory Diagnosticians (WAVLD) and coordinated planning for a meeting held in Berlin, Germany, June 2013. Future meetings are now being planned for Saskatchewan, 2015, and Italy, 2017.
- Director now serving as the executive director of the American Veterinary Epidemiology Society (AVES) since 2013.
- The UKVDL QA/QC section implemented major modules of the Q-Pulse QA/QC software, which aids in managing SOPs, CAPAs, training records, and other documents that support the quality control CQI processes.
- Maintained AAVLD accreditation and NAHLN (USDA) and VetLIRN (FDA) member laboratory status through the oversight of proficiency testing and quality control programs, faculty and staff continuing medical education initiatives, and participation in outbreak response and emergency exercises.
- AAVLD accreditation team five-year visit August 18–20, 2014. Evaluation resulted in a one-year extension of full accreditation pending responses to some non-conformances identified by the AAVLD team.
- Director provided leadership and guidance for faculty and staff to enhance the UKVDL outreach programs through one-day symposia and seminars (food animal, equine, poultry, toxicology, CWD). The Equine Diagnostic Research Seminars reach a global audience through partnership with *The Horse* magazine.
- Provided vision and oversight for a UKVDL strategic and marketing plan to improve client services and enhance testing and collection of fees.
- Director worked with UK higher administration and Lincoln Memorial University (LMU) leaders, which resulted in a cooperative agreement to provide training for senior veterinary medical students in exchange for funds that can be used to improve UKVDL services and research capability in support of Kentucky animal agriculture (\$500,000 annually beginning in 2017).
- Q-Pulse QA/QC software implemented at UKVDL in preparation for the upcoming AAVLD accreditation visit.
- Equine leptospirosis awareness and vaccine initiative: national seroepidemiological survey and ongoing discussions and collaboration with Zoetis Animal Health (formerly Pfizer) and Texas A&M University.
- Genomics diagnostic laboratory section for UKVDL: ongoing discussions with Columbia University, Texas A&M University and the Kentucky Horse Racing Commission.
- Epidemiology section continues to oversee the operation of a real-time animal disease cluster detection system for Kentucky and field investigations/research studies for clients as needed/requested.
- Continue to provide UKVDL professional exhibits for display at local, state, and national meetings.
- Manage KY-VetLabNet listserv bulletins to more than 600 subscribed clients to maintain a high level of situational awareness for veterinarians and farmers.
- Prepare and distribute weekly reportable disease reports distributed to the Office of the Kentucky State Veterinarian's office.
- Regular articles in the *Kentucky Veterinary Medical Association* magazine (since 2005) and *Kentucky Cattleman Association* magazine (since 2009).

Initiatives and programs

- A revised UKVDL fee schedule went into effect July 1. Overall, 17 test fees out of 233 total tests were increased (7% of test offerings) geared to increase fee income by \$66,105 (5%) for fiscal year 2015.
- The director developed a funding proposal for a new meta-genomics diagnostic laboratory for the UKVDL and presented it to the Kentucky Horse Racing Commission scientific advisory committee.
- The director is exploring the possibility of expanding test offerings to provide diagnostics for Kentucky aquaculture, food safety, and stem cell therapeutics.
- Plan, fund, build, and operate a high throughput sequencing and metagenomics diagnostic laboratory section for UKVDL to assist in the identification of emerging and new pathogens related to animal disease.
- Begin planning for the training of veterinary students in the LMU DVM program and effective utilization of funds generated by this project.
- Complete cost accounting of UKVDL services in time for the new UK budget model implementation.
- Achieve full five-year reaccreditation by the AAVLD accreditation team by October 2015.
- Pursue maintenance funding from the Kentucky legislature to sustain the expanded UKVDL facilities.
- Pursue funding to replace aging instrumentation for UKVDL laboratory sections.
- Continue to explore outreach and continuing educational programs utilizing the UKVDL auditorium.
- Pursue funding to plan and construct historical exhibits in the hallways of the new UKVDL administration wing.

Bacteriology/Mycology

Dr. Erdal Erol, Mr. Steve Locke

The bacteriology/mycology section of the UKVDL receives specimens to culture for the isolation and identification of potentially pathogenic bacteria and fungi from livestock, companion, and other animals. The section performs susceptibility testing on isolates for the treatment of specific pathogens to safeguard the health of animals in Kentucky and beyond. This section performs cultures for *Taylorella equigenitalis* and *T. asinigenitalis* for the federal/state CEM regulatory program in equines. Other specialized cultures and testing techniques include anaerobic culture, mycoplasma culture, mastitis culture, and fluorescent antibody testing for leptospire and clostridia (blackleg). This section performs cultures for the National Poultry Improvement Plan (NPIP) and participates in annual proficiency testing for AAVLD, NPIP salmonella, FDA Vet-LIRN salmonella and Listeria.

This section has secured the funding to purchase specialized bacterial identification equipment, MALDI-TOF. The equipment is expected to be installed in early 2015.

Highlights

- 9494 aerobic cultures were performed on samples submitted to the UKVDL; significant bacterial pathogens such as Nocardioform bacteria, coliforms, beta-hemolytic Streptococci, Salmonella, Pasteurella, Mannheimia, Arcanobacterium, Mycoplasma, and Staphylococci were found.
- 7330 CEM cultures were performed for the CEM regulatory screening program.
- 2712 antimicrobial susceptibilities were performed to determine the antimicrobials that could be used for their treatment in exposed animals (MIC broth micro-dilution method).
- 1378 specimens were tested for leptospire by fluorescent antibody testing.
- 472 specimens were cultured for NPIP Salmonella testing. Our participation in NPIP helps poultry industry improve infectious disease control and eradication programs.
- 283 anaerobic cultures were performed. *Clostridium perfringens* & *C. difficile* screening was the predominant focus.
- 144 ruminant mastitis cultures were performed. Often collaborate with extension veterinarian Dr. M. Arnold for communication of treatment options to clients.
- 158 specimens were tested for fungal pathogens.
- 81 *Clostridium chauvoei* (blackleg) and *Clostridium septicum* fluorescent antibody tests were performed.

Virology

Dr. Erdal Erol

The virology section aids veterinarians and animal owners to diagnose viral infections and to treat and protect their animals and works closely with the UKVDL pathology section to examine necropsy specimens for evidence of viral infections. This section also performs a large volume of regulatory testing for national sales and international and national movement of animals. The virology section provides information to field

veterinarians and animal owners regarding sample selection, preservation, shipping procedures, and interpretation of results.

Highlights

Fluorescent antibody tests (FA), virus neutralization tests, ELISA tests, and virus isolation tests were performed to support Kentucky animal agriculture as outlined in the following table:

Major tests performed in virology section

Disease	Test	Number
Bovine Corona Virus	FA	116
Bovine Respiratory Syncytial Virus	FA	278
Bovine Respiratory Syncytial Virus	VN	8
Bovine Rotavirus	FA	78
Bovine Viral Diarrhea	ELISA	7367
Bovine Viral Diarrhea	FA	883
Bovine Viral Diarrhea 1	VN	94
Bovine Viral Diarrhea 2	VN	94
Canine Adenovirus	FA	10
Canine Corona Virus	FA	33
Canine Distemper Virus	FA	187
Canine Herpesvirus	FA	69
Canine Parainfluenza 2	FA	25
Canine Parvovirus	FA	174
Equine Adenovirus	FA	10
Equine Herpesvirus 1	FA	849
Equine Herpesvirus 1	VN	153
Equine Influenza A1	HI	12
Equine Influenza A2	HI	12
Equine Rotavirus	FA	22
Equine Viral Arteritis	VN	11812
Feline Herpesvirus	FA	29
Feline Infectious Peritonitis	FA	78
Feline Panleukopenia	FA	72
Infectious Bovine Rhinotracheitis	FA	399
Infectious Bovine Rhinotracheitis	VN	80
Parainfluenza-3 Virus	FA	171
Potomac Horse Fever	IFA	208
Vesicular Stomatitis IN	VN	1454
Vesicular Stomatitis NJ	VN	1454
Virus Isolation	VI	828
West Nile IgM Capture	ELISA	41

Molecular Diagnostics

Dr. Erdal Erol

The primary mission of the molecular diagnostic section at the UKVDL is to provide molecular testing on the clinical specimens submitted by animal owners, veterinarians, and pathologists. A number of molecular assays, in the formats of gel-based PCR, real-time PCR, multiplex gel-based PCR or multiplex real-time PCR, are being utilized because of their speed, specificity, and sensitivity. This section analyzes specimens received from the virology and bacteriology sections to obtain a confirmatory diagnosis. In addition, Dr. Erol provides consultations to Kentucky veterinarians and animal owners on the areas of appropriate sample collection and submission, therapeutic advice, interpretation of test results, determination

of appropriate tests, and differential diagnosis. The molecular biology section personnel consist of Dr. Erdal Erol, two full-time technicians, and one half-time technician.

Highlights

The molecular diagnostics section successfully demonstrated its ability to provide accurate, rapid, high-volume testing. This section also became an accredited member of the USDA's National Animal Laboratory Health Network and passed several federal proficiency tests such as foot and mouth disease, classical swine fever, avian influenza and exotic New Castle disease. The membership enables this unit to participate in national veterinary disease surveillance and provide rapid, coordinated diagnostic response in the event of future outbreaks within the veterinary industry.

Dr. Erol performed independent and collaborative research with other scientists, particularly in the topics of equine abortions caused by infectious diseases. The results were presented at national AAVLD meeting and published in peer-reviewed journals.

Major tests performed in the molecular diagnostics section

Test	Number
Bovine Viral Diarrhea	32
Calf Diarrhea Panel	208
Equine Herpes Virus-1 (EHV-1)	637
EHV-1 Pathotyping	35
Equine Herpes virus-2	86
Equine Herpes Virus-4	113
Equine Herpes Virus-5	46
Equine Influenza	195
<i>Lawsonia intracellularis</i>	141
Johne's Disease	64
Potomac horse fever	375
<i>Rhodococcus equi</i>	78
<i>Salmonella</i> spp.	660
<i>Streptococcus equi</i>	451
<i>Tritrichomonas fetus</i>	200
West Nile Virus	16

Pathology, general

David Bolin

The UKVDL pathology section is composed of seven faculty pathologists, a staff laboratory animal pathologist, two post-doctoral scholars (pathology residents), four histology technicians, four full-time necropsy technicians, and three part-time necropsy student workers. The pathologists perform complete necropsy examinations on animals, histopathology on necropsy cases, surgical biopsies, and cytological examinations, all submitted by veterinarians, producers, and pet owners. The pathologists are fully supported by the other laboratory sections in the necropsy investigations.

As part of the comprehensive necropsy examination, additional laboratory tests are ordered by the pathologist to aid in confirming a diagnosis. The abnormal findings on necropsy are correlated with other laboratory tests, including microscopic

examination of the tissues, and a comprehensive report is prepared for every pathology case. Utilizing the abundant cases submitted to the VDL and the faculty expertise, post-doctoral scholars (DVM) are trained in veterinary anatomic pathology in a three-year program. However, with the upcoming cooperative agreement to train Lincoln Memorial University DVM students, the post-doctoral residency program is being discontinued. Visiting senior veterinary students have extern rotations, and surgical residents visit to fulfill the pathology requirement for the American College of Veterinary Surgeons.

Highlights

Necropsy Examinations

Postmortem examinations (necropsies) are conducted on animals submitted to the VDL to identify any pathologic changes in the tissues that would indicate disease, injury, toxicosis, or any other abnormal process resulting in illness.

Necropsies

Species	Number
Avian	72
Bovine	918
Caprine	84
Equine	1,463
Ovine	66
Porcine	32
Small animal	380
Miscellaneous	115
Laboratory animal	104
TOTAL	3,234

Biopsies

Tissue lesions are often removed surgically or portions biopsied from live animals and sent to the laboratory for determination of the type of process, recommended treatment, and potential prognosis. These tissue specimens are processed and microscopic slides prepared for the pathologists to examine by microscopy. Tissue specimens representing 3,151 cases were processed and examined. A report with diagnosis was produced for each case. Typical turn-around on these cases is 24 to 48 hours.

Cytologies

Preparations of cells harvested and/or aspirated from abnormal lesions or abnormal fluids are placed on microscopic slides and stained for examination under the microscope by the pathologists. Cytopathological examinations were performed, diagnoses made, and reports generated for 437 cases.

Pathology, research animal (DLAR)

Kathryn (Casey) Coyle

The research animal pathology service sees mostly small rodents and a variety of other species (see below) of non-human primates and pigs. There were 101 submissions from research animals including clinical pathology samples, biopsies, and necropsies. In addition to research animal work, Dr. Coyle is handling the diagnostic pathology caseload for the agricultural research animals housed at the various UK farms.

DLAR cases in research animal pathology service

Species	Number
Cynomolgus monkey	1
Equine	1
Hamster	2
Mouse	46
Pigeon	1
Porcine	1
Quail	7
Rat	24
Salamander	2
Water	16
Grand Total	101

Clinical Pathology Section

Bonnie L. Decker

The primary mission of the clinical pathology section is to provide chemistry, hematology, endocrine, urinalysis, fluid analysis, fecal parasite exams, and other testing to animal owners, veterinarians, and the agriculture community. The section provides testing related to necropsy as well as support and testing to UKVDL's pathologists. It also supports University of Kentucky equine and animal science researchers, who submit specimens to clinical pathology for monitoring various chemistry, hematology, and endocrine levels in their research animals, and hosts two to three Morehead State University veterinary technician students every year to help them complete their practicum.

Clinical Pathology completes its testing same day as receipt with a few exceptions to get information to the submitting veterinarian as soon as possible to aid in the treatment of their client's animals. Cryptosporidium requires more time and is reported within five working days of receipt. Endogenous ACTH and canine TSH must be in the department by 2:00 P.M. to enable a same day turn around.

The department personnel consist of a full-time chief with a BS MT (ASCP) and 39 years' experience in veterinary and human diagnostic laboratory testing and a half-time veterinary technician with 20 years' experience. Other qualified UKVDL personnel are available for backup and consultation as needed.

Clinical pathology is dedicated to meeting the current and future needs of the agriculture community, companion animal community, and veterinarians.

Highlights

- Review of test numbers to determine test menu adjustments
- 11 percent increase in tests performed in 2013
- All SOPs revised and completed

Quality Control/Quality Assurance

Mary Harbour

The goal of the quality assurance program is continuous improvement of service to clients and to ensure quality results.

Tests performed by clinical pathology section

Test	Number	Test	Number
ACTH, Endogenous	10	Gamma-Electrophoresis	6
Albumin	22	Gamma GT	609
Alpha 1-Electrophoresis	6	Giardia Antigen	20
Alpha 2-Electrophoresis	6	Magnesium	401
Amylase	216	Magnesium-Eye Fluid	2
Beta-Electrophoresis	6	Parasite Identification	3
BUN-Eye Fluid	1	pH-Fluid	90
Calcium	1	Phenobarbital	235
Calcium-Eye Fluid	1	Potassium	3
Chemistry-Eye Fluid	161	Progesterone	268
Chloride	2	RBC	2
Chyle Test	21	RBC-Fluid	81
Complete Blood Count	470	Reticulocyte Count	1
Cortisol, 4 Hr Post Dex	13	Serum Chemistry	822
Cortisol, 8 Hr Post Dex	15	SGPT/ALT	217
Cortisol, Baseline	18	Sodium	3
Cortisol, Post ACTH	52	Specific Gravity	90
Cortisol, Pre ACTH	48	Stone Analysis	294
Cortisol, Pre Dex	11	T3	54
Creatine Kinase	609	T4	315
Creatinine-Eye Fluid	1	Total Protein-Electrophoresis	6
Cryptosporidia	106	Total Protein-Fluid	81
Fecal Examination	968	Trypsinogen/TLI	6
Feline Pancreatic Lipase	2	TSH	15
Fibrinogen	93	Urinalysis	108
Foal IgG	1	WBC-Fluid	82

The design of the program is on based American Association of Veterinary Diagnostic Laboratory (AAVLD) requirements, International Standards Organization (ISO) guidelines, and Organization of International Epizootics (OIE). The UKVDL quality program also helps fulfill the university's mission of improving service delivery while achieving excellent human relations (internally and externally), sound leadership, and effective communications.

Since 2010 UKVDL has been a part of the National Animal Health Laboratory Network (NAHLN). Quality Assurance maintains UKVDL information on the NAHLN portal. This portal provides information to NAHLN about the capacity of national laboratories in the event of a food animal outbreak. The section continues to prepare quarterly reports to the NAHLN and maintains the NAHLN policies and procedures.

The requirements for maintaining the quality system and management are continuously being updated. To maintain conformance to all requirements, the quality assurance manager attended Quality Assurance and Quality Management Training sponsored by USDA/NAHLN at the annual AAVLD meeting as well as AAVLD auditor training.

Besides the continuous improvement of service, the quality assurance section prepared the laboratory for AAVLD accredi-

tation. In August UKVDL was given full accreditation for one year.

The section has implemented new quality system software (Q-Pulse). This software has improved document control, streamlined internal audits, improved equipment inventory, and improved corrective action investigations. Quality assurance will continue to monitor and update policies and procedures to meet the AAVLD requirements.

Ruminant Extension

L. Michelle Arnold

The ruminant extension veterinarian specializes in recognition of disease and tailoring specific prevention and control strategies to improve animal health, which requires being aware of problems as they occur at the diagnostic laboratory and sending this information out to veterinarians, extension agents, and producers quickly where it can make a difference in the field. This action results in increased production, greater profitability, and, ultimately, high-quality Kentucky meat and milk through continuous communication with food animal veterinarians, county extension personnel, producers, state and federal authorities, and university faculty and staff.

Current health concerns, including ruminant disease risk and occurrence, diagnosis, treatment, prevention and control, form the core of the information disseminated. Knowledge generated from university research, new governmental directives, and other stakeholder contributions are also communicated broadly for discussion and action to benefit producers throughout Kentucky.

Highlights

- Updated and presented the herd health portion of Master Stocker in two regions and a Master Grazer session. These programs directly affected many farming enterprises representing significant numbers of Kentucky cattle. Hosted the health portion of the 2014 Cow College in Lexington, sponsored by Boehringer Ingelheim.
- Hosted two well-attended food animal veterinary continuing education meetings at the diagnostic laboratory (UKVDL) and one at the Breathitt Veterinary Center (BVC). A total of 24 hours of continuing education was made available to food animal veterinarians at no cost to them. Outside sponsors covered the costs of the events. The Winter CE meeting at the UKVDL was sponsored by Merck Animal Health. Fifty-five food animal veterinarians attended the winter meeting. A summer meeting was held at the Breathitt Veterinary Center in June. The American Association of Bovine Practitioners (AABP) co-sponsored the event with Zoetis Animal Health and it was attended by 24 food animal veterinarians from the western portion of the state. The final CE meeting was held in August at the UKVDL sponsored by Merial Animal Health. Fifty four veterinarians attended.
- Co-sponsored the Small Ruminant Grazing Conference in Lexington. The meeting drew 74 participants, the largest crowd thus far for this annual meeting. This conference strives to recruit top national speakers in small ruminant topics to keep producers on the forefront of grazing issues as they pertain to sheep and goats. The speaker was Dr. Ray Kaplan, considered the leading expert in anthelmintic resistance in the United States. Each year this conference changes to a different location in Kentucky in order to reach producers in all areas of the state.
- Worked with extension dairy specialist Dr. Jeffrey Bewley to implement a "CowSignals" training course for dairy producers. This program originated in the Netherlands and teaches how to read the body language of cows to improve management techniques.
- Dr. Arnold continued to teach the health portion of the undergraduate classes in beef and dairy science and offer a veterinary lecture to the careers class.
- Continued development of the new extension program called Improving Reproductive Efficiency in Beef Cattle in Northern Kentucky with Drs. Les Anderson, Jeff Lehmkuhler, and Darrh Bullock. These meetings are very specific and target one topic with extensive question and answer periods.
- Delivered an extension agent informational meeting about bovine viral diarrhea via internet (Microsoft Lync) with the Kentucky state veterinarian (Dr. Stout) to keep extension personnel abreast of new regulations regarding BVD PI testing and the new law regarding the movement of positive calves. Provided a statewide Lync session on vaccination protocols for spring.
- Participated in numerous field days, producer meetings, and farm visits throughout the state to educate producers in best management practices as well as to identify existing problems and find ways to promote prevention through realistic on-farm changes.
- Worked closely with the state veterinarian's office to inform producers of the new animal disease traceability regulations.
- The ruminant extension veterinarian was instrumental in educating producers, extension personnel, and veterinarians about the new federal directives regarding the judicious use of antibiotics (Guidance 209 and 213). This new government strategy is affecting the way antibiotics administered through the feed or water are sold to the public and the labeled indications for these products.
- Continued to serve as the attending IACUC veterinarian for the UK swine unit.
- Continue to expand the database of food animal veterinarians to allow rapid communication in the event of an animal emergency situation or disease outbreak. This database is continually updated with email addresses and cell phone numbers to enhance the speed of communication and currently includes approximately 400 veterinarians. Emphasis is placed on gathering email addresses to replace mail whenever possible.
- Participated in conference calls, meetings, and program development with the multi-state committee funded by the Southeast Quality Milk Initiative (SQMI) grant, a multi-state grant including six southeastern land grant institutions for \$3M over a five-year funding period that began in February 2013. I also attended and spoke in the two-day SQMI Annual Meeting held at Virginia Tech. The first SQMI

Quarterly Newsletter was mailed in November to veterinarians throughout the Southeast identified as active in dairy practice.

- Managed cases at the UK Veterinary Diagnostic Laboratory, including recording in-depth histories, determining necessary tests, participating in complex disease investigations, and interpreting and communicating results to veterinarians and producers.

Kentucky veterinarians, extension agents, producers, government entities, and the university benefit from a strong livestock sector of which health is a major consideration. In 2014, this position served to reach each of these stakeholders for the overall improvement of livestock health and sustainability of the food animal veterinary profession.

Serology

Meg Steinman

The mission of the serology section is to provide accurate and timely results for both diagnostic and regulatory testing. The results generated provide veterinarians and regulatory personnel with data upon which to base their decisions. In 2014 staff from this section attended training for poultry testing. This section offers a wide variety of tests by various types of methodologies; the tests and numbers listed below are just a sampling.

Poultry

This section participates in annual audits to maintain status as an NPIP approved laboratory. Personnel from this section attended National Poultry Improvement Plan (NPIP) approved training courses. In 2014 the serology laboratory tested 6,633 samples for antibody to avian influenza, 21,578 samples for antibody to *Salmonella pullorum*, 26,231 samples for antibody to both *Mycoplasma gallisepticum* and *Mycoplasma synoviae*.

Equine

This section successfully passed the USDA-APHIS inspection to continue to offer equine infectious anemia (EIA) antibody testing and piroplasmosis testing. In 2014, we ran 16,578 CELISA and 445 AGID EIA tests. The serology section continues to monitor equines moving through the state stockyards for EIA antibody; they tested 3,839 specimens. All employees of this section passed the required NVSL proficiency testing for piroplasmosis testing *Babesia caballi* (921 samples) and *Theileria equi* (925 samples). We tested 1,141 serum samples for antibody to contagious equine metritis (CEM-CF). Serology performs antibody screening tests for *Leptospira* in equines for diagnostic and regulatory purposes. In 2014, we tested approximately 5,200 serums.

Bovine

The serology section offers a variety of antibody tests performed on serum from bovines and other ruminant species. In 2014 we began to offer a serum test to determine pregnancy status and tested 743 samples. Other testing done include 273 specimens for antibodies to *Anaplasma marginale*, 129

specimens for antibody to bluetongue virus, 453 specimens for antibodies to the bovine leukemia virus, 1,538 serums for Johne's (*Mycobacterium paratuberculosis*) antibodies, approximately 500 samples for *Leptospira* antibodies, and 233 specimens for antibody to *Neospora caninum*. This lab is also active in regulatory screening for antibodies to *Brucella abortus*, testing approximately 1,500 samples.

Small ruminants

The serology section runs testing on small ruminants, including *Brucella melitensis* (50) and small lentivirus virus antibody (175).

Canine and feline

This section offers a variety of tests that can be run on dogs and cats. A few examples of the testing done in 2014 include 125 for antibodies to histoplasmosis and blastomyces. Serology also offers *Brucella canis* testing, an important test for breeding, and tested 101 samples. This summary provides a sampling of the tests we run for these species.

Porcine

This section also offers testing for swine. In 2014 we tested 104 samples for pseudorabies and *Brucella* antibodies.

Additional activity

Meg Steinman serves on a National Animal Health Laboratory Network Exercises and Drills Working Group. The purpose of this group is to develop exercises to help prepare for a disease outbreak in food animals. This year the committee developed a training exercise to determine a laboratory's ability to implement a response plan to keep the food supply safe. Findings from the exercises will help determine the strengths and weaknesses of the individual laboratory and identify improvements that will help with rapid response.

Toxicology

Cynthia L. Gaskill

The primary mission of the toxicology section at the UKVDL is to provide toxicological diagnostic testing capabilities and consultations to Kentucky veterinarians, UKVDL pathologists and residents, county extension agents, livestock producers, pet owners, state officials, and others. A large variety of toxicological tests are available through the section, including assays for metals and minerals; organic compounds including a multitude of pesticides, drugs and other chemicals; biological toxins such as plant, insect, bacterial, and fungal toxins; and numerous other toxicants. Tests are performed in tissues, gastrointestinal contents, biological fluids, baits, feed, forages, water, soil, and many other substances.

Consultation services include assistance with therapeutic advice; differential diagnoses; residue considerations; toxicological risk assessments; determination of appropriate tests; appropriate sample collection and submission recommendations; interpretation of analytical results; and other general toxicological information. Dr. Gaskill also provides the state

veterinarian's office with alerts, updates, and toxicological information regarding cases of poisoning or contaminated animal feeds diagnosed at the UKVDL. In 2014, Dr. Gaskill provided approximately 2,000 toxicological consultations. Toxicology section personnel consist of Dr. Cynthia Gaskill, DVM PhD, ABVT, clinical veterinary toxicologist and section head; Dr. Lori Smith, PhD, senior analytical chemist; Michelle Helm, BSc, chemist/technician; master's student Kyle Francis; post-doctoral scholar Dr. Boying Liang; and several student interns.

Highlights

- Handled a number of herd food animal poisoning cases involving toxic metals such as lead and arsenic and cases involving feed contaminations such as excessive ionophore concentrations. We worked in cooperation with numerous state and federal agencies for these cases. We provided analyses of blood, tissues, and feeds to evaluate herd/flock animals for evidence of exposure; source and tissue residues to assist the state veterinarian with quarantine/withholding time decisions; and toxicological information related to toxicokinetics, environmental considerations, treatments, and other considerations. Our work helped prevent contamination of the human food supply and triggered recalls of contaminated feeds.
- Received a second year of funding from a nationally competitive FDA Vet-LIRN program grant totaling \$500,000 over five years. This funding provides support for instrumentation, personnel, and supplies to develop analytical methods and complete inter-laboratory validation studies for the FDA for analytical testing of contaminated feeds. New LC-MS/MS instrumentation leased using funds from this grant can be used for diagnostic purposes in addition to method development and validations for the FDA, and hence will enable the toxicology section to provide new and updated diagnostic methods. Method development is well under way for this program.
- Successful renewal of a smaller FDA Vet-LRN grant shared with microbiology that helps fund instrumentation maintenance costs, student labor, and supplies associated with increased analyses in large-scale events of contaminated animal feeds. This grant helps provide support for the diagnostic operations of the laboratory. The grant totals \$82,500 over five years.
- We received another year of USDA ARS SCA funding to investigate tall fescue associated intoxication in livestock, for a total of \$69,000 over three years.
- Provided serum and urine cobalt analyses for several research projects sponsored by the Kentucky Equine Drug Research Council, the Canadian Pari-Mutuel Agency Equine Drug Evaluation and Research Center, and other organizations to investigate the illicit use of cobalt in racehorses. This work helped racing authorities establish a recommended threshold for cobalt in racehorses in North America. We also provided serum cobalt analyses for horseracing jurisdictions. We performed more than 4,200 serum cobalt analyses.
- Was well prepared for the AAVLD accreditation inspection and passed the inspection without any non-conformances.

- Acquired hardware and software upgrades for several analytical instruments, which required retraining of staff and updating of more than 20 standard operating procedures (SOPs).
- Several new methods were added to our test offerings and new SOPs were completed, including methods for metal analyses in eggs, serum cobalt analysis for regulatory purposes, and plant alkaloid screens of GI contents.
- Developed methods and performed work for the FDA for cases involving improperly formulated compounded drug products.
- Several publications in peer-reviewed journals resulted from research performed in the toxicology section.
- Hosted student interns for the forensic science internship program at Eastern Kentucky University, two MSc graduate students from UK and EKVU, and one post-doctoral scholar.
- Continued to provide forage ergovaline analyses for the University of Kentucky Horse Pasture Evaluation program, veterinarians, extension agents, and producers.
- Continued participation in several proficiency testing programs to ensure quality results.
- Participated in several additional research projects directly applicable to improvements in diagnostic offerings. Funding for some of these projects help support instrumentation and labor used also for diagnostic purposes.
- Projects include:
 - Investigation into concentrations of moxidectin in brain tissue and serum in horses post-therapeutic dosing to help with diagnostic testing of moxidectin intoxication cases. Funding: Koller Rapid Response grant. M. Nielsen and C. Gaskill, PIs.
 - Evaluation of Kentucky barn owls for evidence of chemical contaminations. K. Heyden, Kentucky Fish and Wildlife Service, PI.
 - Completed investigations into the effects of harvest, transport, storage, and processing conditions on ergovaline analyses of tall fescue; beginning research on detection and quantitation of fescue-related toxins in serum and tissues of exposed animals.
 - Continued development of LC-MS/MS methodology for qualitative and quantitative analyses of anticoagulant rodenticides in feeds and tissues; now provide qualitative analyses at UKVDL.

Research findings, methods, continuing education programs, seminars, and other scientific information were presented at meetings and conferences, including:

- American Academy for Veterinary and Comparative Toxicology annual meeting at the American Association of Veterinary Laboratory Diagnosticians annual meeting, Kansas City, MO.
- The Kentucky Poultry Federation Backyard Poultry Symposium, Lexington, KY.
- The 36th Annual Morehead Clinic Days Veterinary Conference, Morehead, KY.

The Toxicology section provided testing for approximately 1,000 accessions, performing over 10,400 diagnostic toxicologi-

cal analyses, with many cases involving multiple samples such as various forage and feed samples, tissues, body fluids, baits, and other samples, and often involving multiple animals and multiple tests per case. The most common tests requested were serum cobalt analyses; blood lead testing; ergovaline analyses of fescue forages; metal and mineral quantifications in samples such as liver, kidney, and serum; nitrate analyses in ocular fluid; and GC/MS screening of rumen and stomach contents for organic compounds.

Epidemiology

Jacqueline L. Smith

The UKVDL epidemiology section plans and conducts veterinary epidemiological research experiments that lead to the earliest detection of animal disease outbreaks, with our primary mission being to provide animal disease surveillance and to assist veterinarians in the investigation of serious and unusual disease problems. Daily monitoring of finalized necropsy and lab testing data streams provide near real-time disease cluster analysis.

The section conducts data acquisition and statistical analysis in support of the Office of the State Veterinarian and the USDA,

and provides animal health situational awareness for industry stakeholders. Many of these studies lead to publication in peer-reviewed journals and lay publications. Disease reporting to the state veterinarian (reportable infectious diseases, disease of interest, emergency disease notification) is performed weekly for the typical endemic diseases; unusual or emergency disease situations are reported immediately.

In-depth field investigations to better characterize disease outbreaks for identifying causative etiology through the collection of diagnostic specimens and recommending diagnostic testing are provided free of charge to any farm/producer in the state of Kentucky at the request of a local client with the approval of the UKVDL administration.

Highlights

- Conducted 284 telephone consults regarding suggestions, recommendations, and information related to animal health issues.
- 249 statistical requests (from UKVDL faculty, UK faculty, state and federal officials, local veterinarian) (1–10 hrs each)
- 136 graphics requests (2–10 hrs each)
- 52 reportable disease reports sent (approximately 1 hr each week)

Kentucky Agricultural Experiment Station Projects

Hatch, McIntire-Stemmis, and Animal Health projects for calendar year 2014, as reported in the USDA Current Research Information System (CRIS) database, follow.

Agricultural Economics

- A Comprehensive Study of Kentucky's Equine Industry—*Stowe, C.; Rossano, M.; Coleman, R.; Davis, A.*
- Agricultural and Rural Finance Markets in Transition (NC1014, NC221, NCT-194)—*Katchova, A.*
- Assessing the Consumer Behavior, Market Coordination, and Performance of the Consumer-Oriented Fruit and Vegetable Sector—*Woods, T.A.*
- Benefits and Costs of Natural Resources Policies Affecting Ecosystem Services on Public and Private Lands—*Schieffer, J.*
- Economic Effects of Adaptive Behavior with Precision Agriculture Technology—*Dillon, C.*
- Environmental Impacts of Equine Operations—*Stowe, C.*
- Family Firms and Policy in Times of Disruption (NC1030)—*Robbins, L.W.*
- Food Safety Incidents and the Food Supply Chain: The Impacts on Consumers and Producers and the Strategic Response of Supply Chain Managers and Food Industry Leaders—*Saghalian, S.H.*
- The Importance of U.S. Food and Agricultural Trade in a New Global Market Environment—*Reed, M. Nanotechnology and Biosensors—Hu, W.*
- Whole Farm Dairy and Beef Systems: Gaseous Emissions, P Management, Organic Production, and Pasture Based Production—*Kusunose, Y.*

Animal and Food Sciences

- Characterization of Carbon-Centered Free Radicals in Food Proteins—*Boatright, W.*
- Construction of Active Protein Membranes for the Formation of Functional Oil-in-Water Food Emulsions—*Xiong, Y.*
- Development of Methodology for the Analyses of Intrinsic Free Radicals in Foods—*Boatwright, W.*
- Diet and Vascular Endothelial Cell Function—*Hennig, B.*
- Enteric Diseases of Food Animals: Enhanced Prevention, Control, and Food Safety—*Newman, M.*
- Factors Affecting Phosphorus Concentrations and Phosphorus Digestibility in Pasture Herbage Consumed by Grazing Animals—*Lawrence, L.*
- Factors Regulating Muscle Protein Synthesis and Accretion in Horses—*Urschel, K. L.*
- Fate of Antioxidant Peptides and Proteins in Food Processing—*Xiong, Y. L.*
- Integrated Approach to Enhance Efficiency of Feed Utilization in Beef Production Systems—*Matthews, J.C.*
- Limitations in Small Intestinal Carbohydrate Assimilation in Beef Cattle—*Harmon, D.*
- Mastitis Resistance to Enhance Dairy Food Safety—*Bewley, J.M.*
- Metabolic Relationships in Supply of Nutrients for Lactating Cows—*McLeod, K.R.*

- Methods to Increase Reproductive Efficiency in Cattle—*Silvia, W.J.*
- National Animal Nutrition Program—*Cromwell, G.L.*
- Nutritional Systems for Swine to Increase Reproductive Efficiency—*Lindemann, M.*
- Ovarian Influences on Embryonic Survival in Ruminants—*Bridges, P.J.*
- Rapid Assay Probe Technologies and Media for Monitoring Flora in Foodstuffs—*Hicks, C.L.*
- Species-specificity in Carboxymyoglobin Redox Stability—*Suman, S.P.*
- Use of a Carbohydrate-based Toxin Adsorbent Supplement Provided through a Mineral Carrier to Alleviate Endophyte Toxicosis in Beef Cows and Calves Grazing Tall Fescue—*Ely, D.*

Biosystems and Agricultural Engineering

- Agricultural Safety and Health Research and Extension—*Purschwitz, M.A.*
- Development of a Distributed Control and Data Acquisition System for Variable-Rate Applications in Precision Agriculture—*Sama, M.*
- Development of an Algae-based System for CO₂ Mitigation—*Croftcheck, C.L.; Montross, M.D.*
- Development of Stream Assessment Tools and Riparian Corridor Techniques for Enhancing Water Quality in Karst Watersheds in Central Kentucky—*Agouridis, C.T.; Warner, R.C.*
- Engineering for Food Safety and Quality—*Payne, F.A.*
- Integrated Systems Research and Development in Automation and Sensors for Sustainability of Specialty Crops—*Dvorak, J.*
- Marketing and Delivery of Quality Grains and BioProcess Coproducts—*Montross, M.D.; McNeill, S.G.*
- Modeling for TMDL Development and Watershed Based Planning, Management, and Assessment—*Edwards, D.R.*
- Standardized Testing for Global Navigation Satellite System Technology—*Stombaugh, T.*
- Stream/Aquifer Interface: Understanding the Riparian Corridor—*Workman, S.R.*
- The Science and Engineering for a Biobased Industry and Economy—*Nokes, S.E.; Lee, C.; Croftcheck, C.; Montross, M.*

Community and Leadership Development

- A Framework for Secondary Schools Agriscience Education Programs that Emphasizes the STEM Content in Agriculture—*Hains, B.*
- Agricultural Education Research—*Hains, B.*
- Interactions of Individual, Family, Community, and Policy Contexts on the Mental and Physical Health of Diverse Rural Low-Income Families—*Dyk, P.*
- Renewing an Agriculture of the Middle: Value Chain Design, Policy Approaches, Environmental and Social Impacts—*Tanaka, K.*

Entomology

- A Sustainable Approach for Protecting Our Forests From Emerald Ash Borer, with Applications to Other Exotic Wood-boring Invaders—*Rieske-Kimney, L.*
- Bacterial Symbionts and Defensive Traits in Insects—*White, J.*
- Bed Bug Biology and Behavior—*Haynes, K.*
- Biological Control in Pest Management Systems of Plants—*Harwood, J.D.*
- Biological Control of Arthropod Pests and Weeds—*Yeagan, K.V.*
- Biological Improvement of Chestnut through Technologies that Address Management of the Species, its Pathogens and Pests—*Rieske-Kimney, L.K.*
- Biology and Management of Insects Attacking Turf and Woody Landscape Plants—*Potter, D.A.; Redmond, C.T.*
- Biology, Ecology and Management of Emerging Disease Vectors—*Dobson, S.L.*
- Biology, Impact, and Management of Soybean Insect Pests in Soybean Production Systems—*Yeagan, K.*
- Colony Collapse in Termites-RNA Interference-Mediated Genetic Manipulation—*Zhou, X.*
- Defining and Utilizing Selected Molecular Features of Insect Viruses—*Webb, B.A.*
- Delineation of Structural Complexity in Above and Belowground Forest Food Webs—*Harwood, J.D.*
- Ecology and Management of European Corn Borer and Other Lepidopteran Pests of Corn—*White, J.A.*
- Exotic Organisms Interact to Influence Persistence of a Native Species: Potential Interplay between the Asian Chestnut Gall Wasp and its Chestnut Hosts—*Rieske-Kimney, L.K.*
- Genomic and Metagenomic Analyses of a Wood-Feeding Cockroach, *Cryptocercus punctulatus*—*Zhou, X.*
- Identifying Weak Links in Bed Bug Biology—*Haynes, K.*
- Improving Management of Insects of Public Health Significance in Kentucky—*Brown, G.C.*
- Inbreeding Depression in Mating Biology Following Population Bottlenecks in a Storage Pest—*Fox, C.W.*
- Interactions of Emerging Threats and Bark Beetle-Microbial Dynamics in Forest Ecosystems (from W1187)—*Rieske-Kimney, L.*
- Invasive Species and Biological Control: the Role of Facultative Inherited Bacterial Symbionts—*White, J.A.*
- Molecular Analysis of Juvenile Hormone Action in the Red Flour Beetle, *Tribolium cataneum*—*Palli, S. S.*
- Quantifying the Effect of Habitat Structure on Biological Control—*Harwood, J.D.*
- Systematics, Taxonomy, Biodiversity, and Food Web Interactions of Ichneumonidae (Insecta: Hymenoptera)—*Sharkey, M.; Chapman, E.*

Forestry

- Evaluating the Use of Light Detection and Ranging (LIDAR) Information to Improve Forest Management Decisions—*Contreras, M.*
- Forest Management and Foraging Habitat of Bats Vulnerable to White-nose Syndrome—*Lacki, M. J.*
- Multiscale Approaches to Investigate the Effects of Various Anthropogenic Disturbances on Stream-inhabiting Amphibians and Reptiles—*Price, S.*
- Participation of Kentucky Woodland Owners in the Woody Biomass Market—*Stainback, G.A.*
- Silvicultural Approaches to Enhance the Resiliency of Oak-Dominated Forests to Disturbance—*Lhotka, J.*
- Using Remotely-sensed Data to Evaluate Post-fire Vegetation and Fuel Dynamics in Central and Appalachian Hardwood Forests—*Arthur, M.A.*
- Water Resources in a Changing World: How Changes in Climate and Land-Use Influence Water Quality and Quantity in the Cumberland Plateau Region of Kentucky—*Barton, C.*

Horticulture

- Arthropod Resistance of *Lycopersicon hirsutum* LA2329, a Wild Relative of Tomato—*Snyder, J.C.*
- Defining the Role(s) of Plant Sorbitol Dyhydrogenase – *Archbold, D.*
- Developing Optimized Organic Production Systems for Cucurbits and Apples—*Williams, M.*
- Environmental and Genetic Determinants of Seed Quality and Performance (from W1168)—*Downie, A.B.; Geneve, R.L.; Perry, S.; Baskin, C.*
- Identification and Predicting LEA Protein Interacting Proteins—*Downie, A.B.*
- Identifying the Biophysical, Biochemical, Environmental, and Genetic Factors Associated with Seed Development, Dormancy, Germination, and Establishment of Eastern Gamagrass.—*Geneve, R.L.*
- Improving Economic and Environmental Sustainability in Tree-Fruit Production through Changes in Rootstock Use—*Archbold, D.*
- Microbial Based Herbicide Discovery Focused on Cellulose Biosynthesis Inhibitors—*DeBolt, S.*
- Multi-State Evaluation of Wine Grape Cultivars and Clones—*Archbold, D.*
- Quantifying the Linkages Among Soil Health, Organic Farming, and Food—*Jacobsen, K.*
- Sustainable Practices, Economic Contributions, Consumer Behavior, and Labor Management in the U.S. Environmental Horticulture Industry—*Ingram, D.L.*
- Water Management and Quality for Ornamental Crop Production and Health—*Dunwell, W.*

Human Environmental Sciences

- EFNEP Related Research, Program Evaluation and Outreach—*Forsythe, H.E.*
- The Influence of Social Media on Attendee Behavior—*Lu, Y.*

Plant and Soil Sciences

- A Comparison of Soil Seed Bank Dynamics of Herbicide Resistant and Nonresistant *Amaranthus* species—*Baskin, C.*
- Breeding and Genetics of Forage Crops to Improve Productivity, Quality, and Industrial Uses—*Phillips, T. D.*
- Characterizing Mass and Energy Transport at Different Vadose Zone Scales (from W1188)—*Wendroth, O.*
- Complementary Approaches to Developing Scab Resistant Wheat Varieties—*Van Sanford, D.A.*
- Cooperative Variety Testing Programs—*Van Sanford, D.A.*
- Design, Assessment, and Management of Onsite Wastewater Treatment Systems: Addressing the Challenges of Climate Change—*Karathanasis, A.D.*
- Determining Potential Interactions of Genetics and Management in Maize—*Lee, C.*
- Development of External Regulation of Transgenic Traits in Crop Plants—*Davies, H.*
- Ecophysiological Aspects of Forage Management—*McCulley, R.L.*
- Enhancing Nitrogen Utilization in Corn Based Cropping Systems to Increase Yield, Improve Profitability and Minimize Environmental Impacts—*Grove, J.*
- Evaluating the Physical and Biological Availability of Pesticides and Contaminants in Agricultural Ecosystems (from W1082)—*D'Angelo, E.M.*
- Functional Metagenomic Analysis of Soil-Dwelling and Plant-Associated Microbial Communities—*Moe, L.A.*
- Genetic Control of Pod Shattering in Soybeans—*Zhu, H.*
- Hydropedology: Genesis, Properties, and Distribution of Hydromorphic Soils—*Karathanasis, A.D.*
- Improving the Sustainability of Livestock and Poultry Production in the United States—*Grove, J.*
- Influence of Tall Fescue Cultivar and Endophyte Genotype Combinations on Root System Architecture, Exudate Composition, and Soil Biogeochemical Processes—*McNear, D.*
- Molecular Genetic Analysis of a Novel Feedback Inhibition Mechanism in the Cytokinin Response Pathway—*Smalle, J.S.*
- Nitrate-Dependent Iron (II) Oxidation in Soils—*Matocha, C.*
- Nitrifier Community Ecology Influences on Trace Gas Evolution From Agricultural Soil—*Coyne, M.*
- Nitrogen Cycling, Loading, and Use Efficiency in Forage-based Livestock Production Systems (formerly NCT-196 and NC-189)—*Goff, B.*
- Performance of Small Grain Varieties in Kentucky—*Van Sanford, D.A.; Bruening, W.P.*
- Plant Genetic Resources Conservation and Utilization—*Phillips, T.D.*
- Precision Conservation with Geospatial Technologies—*Mueller, T.G.; Shearer, S.A.*
- Reduction of Tobacco-specific N-nitrosamines (TSNA) in Dark Tobaccos—*Bailey, W.A.*
- Regulation of Gene Expression during Plant Embryogenesis—*Perry, S.E.*
- Soil Survey Characterizations and Interpretations for Kentucky Soils—*Karathanasis, A.D.*
- Triacylglycerol Biosynthesis in Soybeans—*Hildebrand, D.*
- Turfgrass and the Environment—*Barrett, M.*
- Turfgrass Management Practices in Kentucky—*Williams, D.W.; Powell, A.J.*

Plant Pathology

- Cellular and Molecular Biology of Plant Rhabdoviruses—*Goodin, M.M.*
- Characterization of Emerging Viruses—*Goodin, M.*
- Characterization of Resistance Gene-mediated Signaling and Role of Oleic Acid and Glycerol 3-Phosphate in Plant Defense—*Kachroo, P.*
- Dissecting Defense Signaling Pathways in Soybean and Arabidopsis—*Kachroo, A.*
- Elucidating and Manipulating Alkaloid Biosynthesis Pathways in the Plant-symbiotic *Epichloe* and *Neotyphodium* species of fungi—*Schardl, C.*
- Molecular Biology of the Interaction between Corn and Corn Stalk Rot Fungi—*Vaillancourt, L.J.*
- Mycotoxins: Biosecurity, Food Safety and Biofuels Byproducts (NC129, NC1025)—*Vaillancourt, L.J.*
- New Strategies to Induce Resistance against Tombusviruses Based on Host Factors—*Nagy, P.*
- Population Dynamics and Fitness Roles of Host Specificity Genes in the Fungus *Magnaporthe oryzae*—*Farman, M. L.*

Veterinary Science

- A Novel Dimorphic Fungus as an Emerging Cause of Reproductive Losses in Mares and Other Livestock—*Szwerczek, T.W.*
- Computational Methods for mRNA Transcriptome from RNA-Seq Data—*MacLeod, J.N.*
- Control of Equine Gastrointestinal Parasites: Immunology, Host Genetics, and Drug Resistance—*Nielsen, M.*
- Control, Transmission, and Prevalence of Natural Infections of Internal Parasites of Equids and Ruminants—*Lyons, E.T.*
- Equine Infectious Anemia Virus Detection and Control in Equid Populations—*Issel, C.J.; Cook, R.F.; Cook, S.J.*
- Genetic Basis of Attenuation of the T953 Strain of EHV-1 and Development of a Genetically Defined Live Attenuated Equine Herpesvirus-1 Vaccine—*Balasuriya, U.*
- Interactions of Equine Viral Pathogens with the Equine Innate Immune System—*Chambers, T.M.; Horohov, D.W.*
- Investigation of *Sarcocystis neurona* Genes Involved in Parasite Survival and Pathogenesis—*Howe, D.K.*
- National Animal Genome Research Program—*Bailey, E.*
- Reference Standards, Internal Standards and Critical Reagents/Regulatory Analytes for Analytical/Toxicological Approaches to Problems in Equine Medicine—*Tobin, T.*
- Studies on Regulation of Reproduction in the Horse—*Ball, B.*
- The Immunological Basis for *Rhodococcus equi* Susceptibility in the Foal—*Horohov, D.W.*
- Vasomodulatory Effects of Endophyte Infected Tall Fescue in Horses—*McDowell, K.; Lawrence, L.; Bush, L.*

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, 2014–December 31, 2014) and any budgetary addition or reduction to existing projects processed within the reporting period. The grant is listed under the department of the principal investigator.

4-H Central Operations

Total—\$32,293

- Communities Preventing Childhood Obesity Coaching, Kansas State University, \$29,293—*Kahl, D.*
Engaging Youth Serving Communities 12 (EYSC12), National Four-H Council, \$3,000—*Mains, M.*

Agricultural Economics

Total—\$610,680

- 2014 Farm Bill Education, Farm Service Agency, \$83,209—*Davis, T.; Burdine, K.; Halich, G.; Snell, W.*
A Regional Program for Production of Multiple Agricultural Feedstocks and Processing to Biofuels and Biobased Chemicals, Louisiana State University, \$32,163—*Mark, T.*
Assessing the Risk Reduction Impacts of the Dairy Producer Margin Protection Program, Economic Research Service, \$25,000—*Mark, T.; Burdine, K.*
Community Assessment and Education to Promote Behavioral Health Planning and Evaluation (CAPE), Michigan State University, \$81,347—*Davis, A.*
Economic Considerations of Aggressively Treating the Influenza Virus in Equines, Zoetis LLC, \$57,344—*Stowe, C.*
Evaluation of Ag Development Board Funding, KY Governor's Office of Agricultural Policy, \$145,000—*Davis, A.; Maurer, R.*
Going to the Farm-acy: The Effect of CSA-Backed Produce Prescriptions on Eating Behaviors and Health Outcomes in Rural Kentucky, Agricultural Marketing Service, \$96,512—*Woods, T.; Allen, J.; Davis, A.*
Helping Artisans Reach Global Markets Expansion—*SRDC eCommerce Extension Initiative, Mississippi State University, \$12,580—Davis, A.; Bowker, S.*
Implement Plan of Work for the Southern Region SARE program, University of Georgia, \$34,639—*Meyer, A.*
Low Cost Biomass Saccharification Process for Processing Biofuels, Eastern KY University, \$9,553—*Mark, T.*
SARE—*PDP—Program Assistant 2014–15, University of Georgia, \$22,222—Meyer, A.*
SARE Sustainable Ag Training Program (MSP), University of Georgia, \$11,111—*Meyer, A.*

Agricultural Programs

Total—\$391,000

- EDEN Strengthening Community Agrosecurity Preparedness (S-CAP) Workshop Update, Purdue University, \$30,000—*Higdon, A.; Dwyer, R.; Newman, M.*
Kentucky AgrAbility, National Institute of Food and Agriculture, \$180,000—*Hancock, J.*
Nutrient Management Planner, Natural Resources Conservation Service, \$60,000—*Gumbert, A.*

- Pesticide Safety Education Program Improvement and Modernization Initiative, CropLife Foundation, \$75,000—*Yeargan, R.*
University of Kentucky Cooperative Extension Service Liaison, KY Energy and Environment Cabinet, \$46,000—*Gumbert, A.*

Animal and Food Sciences

Total—\$3,916,738

- BHEARD Malawi Graduate Training in Dairy Management Systems, Michigan State University, \$170,522—*Bewley, J.*
DAIREXNET Leadership Funds, University of Nebraska, \$10,000—*Amaral-Phillips, D.*
Editor of the Journal of Nutritional Sciences, Elsevier Science Inc., \$39,133—*Hennig, B.*
Effects of Dietary Antioxidant Supplementation on DHA-Enriched Pork Meat, Alltech Biotechnology Inc., \$16,380—*Lindemann, M.; Xiong, Y.*
Effects of Feeding Alltech SP1 to Lactating Dairy Cattle, Alltech Biotechnology Inc., \$3,360—*Bewley, J.*
Elanco Dairy Decision Support, Elanco Animal Health, \$179,092—*Bewley, J.*
Evaluation of a Novel Footbath Delivery System, GEA Farm Technologies Incorporated, \$11,338—*Bewley, J.*
Evaluation of Formulations for a Dry-off Treatment for Lactating Dairy Cows, Amelgo LLC, \$37,446—*Bewley, J.*
Evaluation of Peroxide Teat Dip, GEA Farm Technologies Incorporated, \$11,338—*Bewley, J.*
Fatty Acid Profile in Ruminant Content and Blood Plasma of Finishing Beef Cattle, Supplemented With Different Levels of Marine Algae, Alltech Biotechnology Inc., \$53,760—*Harmon, D.*
Fighting with Food: Battling Chemical Toxicity with Good Nutrition, Miami University, \$33,246—*Hennig, B.; Gaetke, L.*
Genomic Selection for Improved Fertility of Dairy Cows with Emphasis on Cyclicity and Pregnancy, Texas A&M University, \$16,416—*Amaral-Phillips, D.*
Impact of Algae Supplemented Diets Combined with Antioxidants on the Nutrition Profile, Quality Attributes, and Storage Stability of Chicken Broiler Meat, Alltech Biotechnology Inc., \$40,708—*Xiong, Y.*
Improving Fertility of Dairy Cattle Using Translational Genomics, Washington State University, \$26,306—*Amaral-Phillips, D.*
Integrated Program for Reducing Bovine Respiratory Disease Complex in Beef and Dairy Cattle, Texas A&M Research Foundation, \$101,176—*Bullock, K.*
Nutrition and Superfund Chemical Toxicity, National Institute of Environmental Health Sciences, \$2,442,381—*Hennig, B.; Gaetke, L.*
Proteome Basis of Pale, Soft, and Exudative Condition in Broiler Meat, Mississippi State University, \$50,000—*Suman, S.*
Small and Backyard Flocks CoP Support Funds 2014, University of Nebraska, \$10,000—*Pescatore, A.*

- Southeast Quality Milk Initiative: Implementing Science-Based Recommendations to Control Mastitis & Improve Milk Quality in the Southeast, University of Tennessee, \$127,051—*Bewley, J.; Arnold, L.; Garkovich, L.*
Student Sponsorship Agreement for Amanda Pesqueira, Alltech Biotechnology Inc., \$35,000—*Harmon, D.*
Student Sponsorship Fisher, Alltech Biotechnology Inc., \$37,800—*Pescatore, A.*
The Alltech-UK Animal Nutrigenomics Alliance, Alltech Biotechnology Inc., \$143,996—*Matthews, J.*
Use of In Vitro Fermentation as a Comparative Measure of Ionophore Function, Zoetis LLC, \$112,519—*Harmon, D.*
Using Heterospecific Embryo Transfer to Study Conceptus:Uterine Interactions in Large Bovids, National Institute of Food and Agriculture, \$207,769—*Silvia, W.*

Associate Directors

Total—\$1,084,848

- 2013–14 Acquisition of Goods & Services for the USDA Offices in Ag North—*Lab & Field Work, Agricultural Research Service, \$29,143—Cox, N.*
2013–14 Acquisition of Goods & Services for the USDA Offices in Ag North—*O&M, Agricultural Research Service, \$9,999—Cox, N.*
2014–15 Acquisition of Goods & Services for the USDA Offices in Ag North—*Lab & Field Work, Agricultural Research Service, \$6,216—Cox, N.*
FAPRU SCA, Agricultural Research Service, \$862,798—*Cox, N.; Workman, S.*
Kentucky Equine Medical Director, KY Horse Racing Commission, \$176,692—*Oliver, L.*

Biosystems and Ag Engineering

Total—\$516,345

- Alliance for Food Security through Reduction of Postharvest Loss and Food Waste, Oklahoma State University, \$27,386—*McNeill, S.*
Appalachian Research Initiative for Environmental Science (ARIES), Virginia Polytechnic Institute and State University, \$35,000—*Warner, R.; Agouridis, C.; Barton, C.; Uhrine, J.*
CES Radon Outreach Program, KY Department for Public Health, \$42,028—*Fehr, R.*
Energy Education Awareness and Action (E2A2), KY Energy and Environment Cabinet, \$17,500—*Fehr, R.*
Enhancement of Collaboration at the Annual Meeting of Institute of Biological Engineering (IBE), Oak Ridge Associated Universities, \$3,000—*Crofcheck, C.*
Ensuring Restoration Success and Management Effectiveness for the Imperiled Blackside Dace at Cumberland Gap National Historical Park: Sediment Acquisition and Modeling of Davis Branch, US Geological Survey, \$50,600—*Warner, R.; Agouridis, C.*

Heating Broiler Barns with a Wood Pellet Furnace, KY Energy and Environment Cabinet, \$20,000—*Overhults, D.*

Kentucky Cooperative Extension Education Energy Outreach Program, 2014–2015, KY Energy and Environment Cabinet, \$100,000—*Fehr, R.*

Managing Mud, Manure, and Runoff: Kentucky Livestock BMP Demonstration and Training Project, KY Energy and Environment Cabinet, \$18,000—*Higgins, S.; Gumbert, A.*

Methods to Increase Bale Density, Case New Holland America LLC, \$81,362—*Montross, M.*

Nigeria Capacity Building on Stored Commodities, Foreign Agricultural Service, \$56,705—*McNeill, S.*

Proposal to Host Borlaug Fellow from Mexico on Greenhouse Gas (GHG) Emissions from Composting, Foreign Agricultural Service, \$24,764—*Taraba, J.; Coyne, M.; Reed, M.*

Safety in Agriculture for Youth (SAY), Pennsylvania State University, \$25,000—*Purschwitz, M.*

Support of the French Tobacco Sector in its Strip-Tillage, Harvesting Mechanization Projects, Curing, and Stripping of Burley Tobacco, Arvalis Institut du Végétal, \$15,000—*Wells, L.*

Community and Leadership Development

Total—\$367,528

E-Discovery Challenges You!, Appalachian Regional Commission, \$275,000—*Hustedde, R.; Denham, M.*

Environmental and Natural Resources for the AG Educator: Incorporating the Environment into Your Curriculum, KY Department of Education, \$6,911—*Epps, R.*

Southeast Center: CROPS Supplement, National Institute of Occupational Safety and Health, \$82,617—*Vincent, S.*

University of Kentucky Professional Development Perkins Leadership Project 2014–15, KY Education and Workforce Development Cabinet, \$1,500—*Epps, R.; Vincent, S.*

University of Kentucky Professional Development Perkins Leadership Project 2014–15, KY Education and Workforce Development Cabinet, \$1,500—*Vincent, S.; Epps, R.*

E-extension

Total—\$459,913

Building Cooperative Extension's 21st Century Network, University of Nebraska, \$459,913—*Wood, C.*

Entomology

Total—\$1,868,898

2010 University Protocol for Evaluating Field Efficacy of Herculex I, YieldGard Corn Borer, and Bt11xMIR162 Deployed Against Corn Earworm, Fall Armyworm, and Other Southern U.S. Lepidoptera Larvae, Pioneer Hi Bred International Inc., \$30,580—*Bessin, R.*

2015–2016 Private Pesticide Applicator, KY Department of Agriculture, \$27,500—*Townsend, L.*

A Long-term Evaluation of the Interacting Effects of Fire and White-Nose Syndrome on Endangered Bats, Eastern KY University, \$57,943—*Rieske-Kinney, L.*

Asian Longhorned Beetle (ALB) Outreach in Kentucky, Animal and Plant Health Inspection Service, \$37,500—*Lensing, J.; Harper, C.*

Biological Assessments of the Eastern Kentucky Training Site and H.R. Disney Training Site in Kentucky, Eastern KY University, \$11,689—*Rieske-Kinney, L.*

Biological Control of the Hemlock Woolly Adelgid, Animal and Plant Health Inspection Service, \$15,000—*Lensing, J.*

Cooperative Agricultural Pest Surveys, Animal and Plant Health Inspection Service, \$101,460—*Lensing, J.; Harper, C.*

Development of Novel Insecticide Synergistic for Resistance Management, Agricultural Research Service, \$130,000—*Palli, S.*

Efficacy of Management Tools for Armored Scale in Containers, University of Florida, \$10,000—*Potter, D.*

FY 13–14 UK Mosquito Surveillance, KY Department for Public Health, \$10,000—*Brown, G.*

FY 15–16 UK Mosquito Surveillance, KY Department for Public Health, \$10,000—*Brown, G.*

Grape Commodity Survey, Animal and Plant Health Inspection Service, \$7,500—*Lensing, J.; Harper, C.*

Gypsy Moth Survey, Animal and Plant Health Inspection Service, \$252,600—*Lensing, J.; Harper, C.*

Imported Fire Ant Survey, Animal and Plant Health Inspection Service, \$3,758—*Lensing, J.; Collins, J.*

Integrating Biological Control and Chemical Suppression to Save Our Ash Resources, Forest Service, \$45,000—*Rieske-Kinney, L.; Townsend, L.*

Invasive Asian Earthworms: Mounting Threat to North American Golf Courses, O J Noer Research Foundation Inc., \$9,700—*Potter, D.*

Kentucky IPM Extension and Implementation Program: 2014–2017, National Institute of Food and Agriculture, \$65,000—*Bessin, R.; Dunwell, W.; Gauthier, N.; Knott, C.; Lucas, P.; Saha, S.*

KSEF R&D: Applying Next Generation Sequencing Technology to Estimate Biodiversity: A New Tool to Accurately, Rapidly and Efficiently Solve an Old Problem, KY Science and Technology Co Inc., \$29,982—*Sharkey, M.; Chapman, E.*

Mechanisms of RNA Interference, Iowa State University, \$120,000—*Palli, S.*

Monitor Gypsy Moth Populations for Slow the Spread Program, Slow the Spread Foundation, \$44,000—*Harper, C.*

Orchard Commodity Survey, Animal and Plant Health Inspection Service, \$8,000—*Lensing, J.; Harper, C.*

P450 Inhibition Assays, Agricultural Research Service, \$45,000—*Palli, S.*

Pesticide Safety Education, National Association of State Departments of Agriculture Research Foundation, \$18,100—*Townsend, L.*

Phytophthora ramorum Nursery Survey, Animal and Plant Health Inspection Service, \$25,106—*Lensing, J.; Collins, J.*

Pine Shoot Beetle Survey, Animal and Plant Health Inspection Service, \$11,290—*Lensing, J.; Harper, C.*

Regional Firewood Outreach and Education Program, KY Division of Forestry, \$75,000—*Collins, J.; Lensing, J.*

SBIR Phase 1: A Novel Biological Method to Suppress Insecticide Resistance in Transgenic Plants, ParaTechs Corp, \$44,197—*Webb, B.*

SBIR Phase 2 - Biological Vector Control Reducing Arboviruses, Including Dengue and Chikungunya, MosquitoMate Incorporated, \$13,767—*Dobson, S.*

Semiochemicals Offer Hope for Managing the Granulate Ambrosia Beetle, an Invasive Pest of Chestnut, Northern Nut Growers Association, \$6,924—*Rieske-Kinney, L.*

Specialty Crop: Assessing the Interactive Effects of On-farm Management in Cucurbit Production Systems, KY Department of Agriculture, \$49,502—*Harwood, J.; Schmidt, J.; Williams, M.*

TCN: Collaborative Research: Plants, Herbivores, and Parasitoids: A Model System for the Study of Tri-Trophic Associations, University of Delaware, \$12,510—*Sharkey, M.*

Thousand Cankers Disease Survey, Animal and Plant Health Inspection Service, \$17,972—*Lensing, J.; Harper, C.*

Trial of IV Formulas, Intellectual Ventures Management LLC, \$69,500—*Dobson, S.*

Who's Eating the Dubas Bug? Characterization of Biological Control through Molecular Gut Analysis, Research Council of Oman, \$452,818—*Harwood, J.*

Family and Consumer Sciences

Total—\$9,911,579

2014 Military Teen Adventure Camps, Purdue University, \$485,790—*Ashurst, K.*

Collaborative Environment Approaches to Reduce Obesity Disparities in Kentucky, Center for Disease Control and Prevention, \$629,004—*Vail, A.; Bastin, S.; Brewer, D.; Davis, A.; Gustafson, A.; Kurzynske, J.; Mullins, J.; Stephenson, T.; Webber, K.*

DoD Deployment Support Camp Grant, Kansas State University, \$40,000—*Ashurst, K.*

Kentucky Military-Extension Adventure Camp Initiative, Purdue University, \$56,807—*Ashurst, K.*

KY Operation Military Kids 2014, Army, \$42,500—*Ashurst, K.*

UK Supplemental Nutrition Assistance Program Education (SNAP-Ed), KY Cabinet for Health and Family Services, \$8,482,478—*Vail, A.; Mullins, J.*

University of Kentucky National Nutrition Education and Obesity Prevention Coordination Center of Excellence, National Institute of Food and Agriculture, \$175,000—*Vail, A.; Brewer, D.; Kurzynske, J.; Mullins, J.*

Forestry

Total—\$1,227,807

Assessing Potential Impact of White-Nose Syndrome on Bats in the Greater Yellowstone Ecosystem: Development of a Bat Monitoring Program for Yellowstone National Park, National Park Service, \$35,250—*Lacki, M.*

Cow and Calf Elk Survival and Cause-Specific Mortality, Rocky Mountain Elk Foundation, \$29,200—*Cox, J.*

Evaluate Habitat Utilization and Baseline Abundance of Northern Long-Eared Bats at Mammoth Cave National Park, National Park Service, \$142,000—*Lacki, M.*

Forest Health & Research Education Center, Forest Service, \$350,000—*Baker, T.*

Forest Stewardship Publicity and Training, KY Division of Forestry, \$10,000—*Stringer, J.*

Invasive Plant Cost-Share Project, KY Division of Forestry, \$156,225—*Thomas, W.; Stringer, J.*
 Kentucky Woodlands Magazine—How to Maintain a Healthy Forest, KY Division of Forestry, \$16,000—*Stringer, J.; Thomas, W.*
 KY Master Logger Classes, KY Division of Forestry, \$20,000—*Stringer, J.*
 Mower Tract Ecological Restoration, American Rivers, \$74,172—*Barton, C.*
 Resource Selection, Movement Patterns, Survival, and Cause-Specific Mortality of Adult Bull Elk in KY, KY Department of Fish and Wildlife, \$27,500—*Cox, J.*
 Response of Bat Populations at Mammoth Cave National Park to White-Nose Syndrome, National Park Foundation, \$21,660—*Lacki, M.*
 Restoring Native Forests and Wildlife Habitat on Mined Land at Robinson Forest, Kentucky, National Fish and Wildlife Foundation, \$140,000—*Barton, C.; Stringer, J.*
 Survival, Cause-specific Mortality, and Natalivity of White-tailed Deer in Southeast Kentucky, KY Department of Fish and Wildlife, \$145,800—*Cox, J.*
 Triplett Creek Stewardship Project, KY Division of Forestry, \$60,000—*Thomas, W.; Stringer, J.*

Horticulture

Total—\$981,559

Clean Water3—*Reduce, Remediate, Recycle: Informed Decision-Making to Facilitate Use of Alternative Water Resources and Promote Sustainable Specialty Crop Production, Clemson University*, \$56,790—*Ingram, D.*
 Drilling for Biofuel: Uncovering the Potential of Wasp Venom for the Production of Renewable Energy, KY Science and Technology Co Inc., \$29,982—*DeBolt, S.*
 Ginseng 2014 & 2015, KY Department of Agriculture, \$20,000—*Wright, S.*
 Greenhouse Gas Emissions (Carbon Footprint) and Associated Costs of Tree Production Components in a Pot-in-Pot (PNP) System, Horticultural Research Inst, \$15,000—*Ingram, D.*
 KHC VI—*Lexington, KY Horticulture Council*, \$545,000—*Ingram, D.; Woods, T.*
 Optimizing Plant Growth and Water Use By Modifying Cyclic Irrigation Timing in Container Nursery Production, Horticultural Research Inst, \$16,962—*Geneve, R.*
 Shielding Cucurbit Crops for Resilient Agroecosystems, Iowa State University, \$11,317—*Williams, M.; Bessin, R.*
 The Impact of Sterol Biogenesis on Cellulose Synthesis in Higher Plants, Kansas State University, \$66,336—*DeBolt, S.*
 Viticulture & Enology Extension and Research Program, KY Governor's Office of Agricultural Policy, \$220,172—*DeBolt, S.; Houtz, R.*

International Programs

Total—\$59,027

Extension Services in Serbia and Montenegro, Foreign Agricultural Service, \$59,027—*Reed, M.*

Kentucky Small Business Development Center

Total—\$1,552,643

Economic Gardening, Rural Development, \$46,615—*Naugle, L.; Davis, A.*
 Kentucky Procurement and Technical Assistance Program, Defense Logistics Agency, \$249,244—*Naugle, L.*
 Kentucky Small Business Development Center, Small Business Administration, \$1,123,284—*Naugle, L.*
 KY Small Business Development Center Lease, Commerce Lexington Inc., \$13,500—*Naugle, L.*
 Procurement and Technical Assistance Center, KY Economic Development Cab, \$100,000—*Naugle, L.*
 Procurement Assistance, KY Economic Development Cab, \$20,000—*Naugle, L.*

Kentucky Tobacco Research and Development Center

Total—\$5,796,917

"HP 400" Evaluation of the Efficacy of HP400 in Reducing TSNAs, Council for Burley Tobacco, \$4,500—*Jack, A.; Fisher, C.; Ji, H.*
 "Quercetin" The Effects of Pre-Harvest Quercetin Application on the Accumulation of Tobacco-Specific Nitrosamines, Council for Burley Tobacco, \$6,300—*Jack, A.; Fisher, C.; Ji, H.; Smalle, J.*
 "Sample Prep" Sample Preparation for TSNA Analysis, Council for Burley Tobacco, \$9,000—*Jack, A.; Fisher, C.; Ji, H.*
 Altria NNK Research, Altria Corporate Services Inc., \$77,000—*Ji, H.; Bush, L.*
 Cytokinin Application to Reduce TSNAs in Burley Tobacco, Council for Burley Tobacco, \$10,000—*Jack, A.; Fisher, C.; Ji, H.; Smalle, J.*
 Development and Distribution of a Certified Reference Cigarette Suitable for Research Applications and Establishing a Proficiency Testing Program at the University of KY Reference Cigarette Program, Food and Drug Administration, \$5,153,652—*Chambers, O.; Ji, H.; Yuan, L.*
 Engineering Floricultural Crops for Resistance to Tomato Spotted Wilt Virus, Fred C Gloeckner Foundation, \$12,000—*Zaitlin, D.; Goodin, M.*
 Folium—*Evaluation of Tobacco BioFuels Production, University of California Berkeley*, \$188,184—*Yuan, L.; Chambers, O.; Mundell, R.*
 Production of Proteins in Plant, Impossible Foods Incorporated, \$321,280—*Yuan, L.*
 The DNA Sequence of the Burley Tobacco Genome, Council for Burley Tobacco, \$15,000—*Zaitlin, D.; Yuan, L.*

Landscape Architecture

Total—\$112,500

Integrating Spatial Educational Experiences (Isee)—*Mapping a New Approach to Teaching and Learning Soil Science, Purdue University*, \$112,500—*Lee, B.; Karathanasis, A.*

Livestock Diagnostic Disease Center

Total—\$437,300

Bovine Spongiform Encephalopathy Testing and Related Services, KY Department of Agriculture, \$16,800—*Carter, C.*
 Diagnostic Laboratory Support of NAHLN, Animal and Plant Health Inspection Service, \$55,000—*Carter, C.*
 FDA Vet-LRN Veterinary Diagnostic Laboratory Cooperative Agreement Program Funding, Food and Drug Administration, \$16,500—*Gaskill, C.; Carter, C.; Erol, E.*
 Use of Ear Tags for Early Disease Detection in Cattle, National Institute for Hometown Security, \$250,000—*Carter, C.; Vanzant, E.*
 Validation of LC-MS/MS Analysis of Animal Tissue and Feed Matrices for Toxicants, Food and Drug Administration, \$99,000—*Gaskill, C.; Smith, L.*

Merchandising, Apparel and Textiles

Total—\$110,000

2015 Cotton Incorporated Laundry Study, Cotton Incorporated, \$50,000—*Easter, E.*
 Cotton Incorporated Laundry Study 2014, Cotton Incorporated, \$60,000—*Easter, E.*

Nutrition and Food Science

Total—\$388,746

KY CYFAR PD&TA Program, University of Minnesota, \$100,000—*Kurzynske, J.; Ashurst, K.; Stivers, W.*
 Specialty Crop: Plate it Up, Kentucky Proud Recipe Development for Consumers and Producers with One-Dish Healthy Meals Research Component, KY Department of Agriculture, \$49,996—*Stephenson, T.; Vail, A.*
 Strong Dads, Resilient Families, National Institute of Food and Agriculture, \$145,000—*Kurzynske, J.; Ashurst, K.; Jones, K.*
 The YMCA, UK and KSU: Yes (Youth Engagement and Support) Jefferson County!, National Institute of Food and Agriculture, \$93,750—*Kurzynske, J.; Ashurst, K.; Jones, K.*

Plant and Soil Sciences

Total—\$3,134,746

A Knockdown-Towards-Mutation Approach for Manipulating the Chemistry of Tobacco, British American Tobacco, \$129,627—*Wagner, G.; Mihaylova-Kroumova, A.; Yuan, L.; Zaitlin, D.*
 Accelerating the Development of FHB-Resistant Soft Red Winter Wheat Varieties, Agricultural Research Service, \$68,823—*Van Sanford, D.*
 Alternative Polyadenylation and Mon-stop mRNAs in Arabidopsis, National Science Foundation, \$12,144—*Hunt, A.*
 An Integrated Approach to Understand the Agronomic Responses to Poultry Litter Use in Soybean and Corn Production Systems, KY Corn Growers Association, \$35,000—*Ritchey, E.; Hershman, D.; Martin, J.*
 An Integrated Approach to Understanding the Dynamics of Poultry Litter Use, Kentucky Soybean Promotion Board, \$35,000—*Ritchey,*

- E.; Hershman, D.; Martin, J.*
Bayer Soybean, Bayer CropScience GmbH, \$10,000—*Lawson, S.; Slack, C.*
- Burley Tobacco Breeding and Genetics, Philip Morris International Management SA, \$325,000—*Miller, R.*
- Challenges in Soybean Irrigation—*Soil and Crop Irrigation Management (SCIM), Southern Soybean Research Program*, \$8,090—*Wendroth, O.; Knott, C.; Lee, C.; Murdock, L.*
- Characterization of Environmental Transformation, Exposure from Sediment, and Toxicity (E-TEST) for ZnO Nanomaterials in Natural Systems, National Science Foundation, \$150,632—*Uhrine, J.*
- Climate Change Impacts on Soil-water Availability under Different Land Management: Forest and Grasslands in MLRA 120, Natural Resources Conservation Service, \$172,000—*Lee, B.*
- Collaborative Research: CPSP30 at the Convergence of Cellular Signaling and RNA Processing, National Science Foundation, \$303,269—*Hunt, A.*
- Conservation Tillage Evaluation in Dark Tobacco, Altria Corporate Services Inc., \$7,000—*Bailey, W.*
- Developing Control Strategies for Glyphosate-Resistant Weeds in Kentucky, Kentucky Soybean Promotion Board, \$16,670—*Martin, J.; Green, J.*
- Development of a Farmer-Friendly AgWeather Website for Kentucky, Kentucky Small Grain Growers Association, \$13,000—*Van Sanford, D.*
- Development of an AgWeather Website for Kentucky Corn Growers, Kentucky Corn Growers Association, \$13,000—*Van Sanford, D.*
- Development of Chia, *Salvia hispanica* L., as a Sustainable Oil Source for Renewable Chemical Applications, Cono SA, \$20,000—*Hildebrand, D.; Phillips, T.*
- Development of Pale Burley Tobacco, Council for Burley Tobacco, \$10,000—*Fisher, C.; Jack, A.; Li, D.*
- Development of User-friendly Markers for Disease Resistance to Potato Virus Y (PVY) and Black Root Rot (BRR) in Burley Tobacco, Council for Burley Tobacco, \$15,000—*Yang, S.*
- Effect of Plant Growth Regulator, Palisade 2EC, and Different Nitrogen Rates on Wheat Growth and Yield, Kentucky Small Grain Growers Association, \$9,776—*Knott, C.; Ritchey, E.; Van Sanford, D.*
- Effect of Planting Date and RM on Performance of DroughtGard Hybrids Under Moderate Stress or VRI Systems, Monsanto Co, \$6,720—*Lee, C.*
- Enhanced Efficiency Nitrogen Fertilizers on the Production and Nutritive Value of Bermudagrass Pastures, Koch Agronomic Services LLC, \$5,490—*Goff, B.*
- Evaluation and Control of Ground Sucker Formation in Burley Tobacco Varieties, Altria Corporate Services Inc., \$49,306—*Miller, R.*
- Evaluation of Residual Properties of MON119096, Monsanto Co, \$6,370—*Martin, J.*
- Fragipan Remediation Corn, Kentucky Corn Growers Association, \$35,000—*Murdock, L.; Grove, J.; Matocha, C.*
- Fragipan Remediation Soybean, Kentucky Soybean Promotion Board, \$35,000—*Murdock, L.; Karathanasis, A.*
- Fragipan Remediation, Kentucky Small Grain Growers Association, \$35,000—*Murdock, L.; Karathanasis, A.*
- Genetic Improvement of Symbiotic Nitrogen Fixation in Soybeans, Kentucky Soybean Promotion Board, \$35,000—*Zhu, H.*
- Improved Chia Production & Product Usage, Kentucky Small Grain Growers Association, \$21,318—*Hildebrand, D.*
- Improving Barley and Wheat Germplasm for Changing Environments, University of California Davis, \$53,368—*Van Sanford, D.*
- Improving Soybean Yields with Crop Rotation, Kentucky Soybean Promotion Board, \$34,928—*Knott, C.; Grove, J.*
- Influence of Microbial-Based Soil Additives on P Speciation and Availability, Agricen Sciences, \$34,062—*McNear, D.*
- Irrigating the Soil to Maximize the Crop—*An Approach for Corn to Efficient and Environmentally Sustainable Irrigation Water Management in Kentucky*, Kentucky Corn Growers Association, \$32,775—*Wendroth, O.; Lee, C.*
- Irrigating the Soil to Maximize the Crop—*An Approach for Soybean*, Kentucky Soybean Promotion Board, \$16,388—*Wendroth, O.; Lee, C.*
- Irrigating the Soil to Maximize the Crop—*An Approach for Wheat to Efficient and Environmentally Sustainable Irrigation Water Management in Kentucky*, Kentucky Small Grain Growers Association, \$16,388—*Wendroth, O.; Lee, C.*
- Low Alkaloid Burley Yield Test: Conservation Tillage, Altria Corporate Services Inc., \$26,666—*Pearce, R.; Fisher, C.*
- Manipulating Grass-Fungal Endophyte Symbioses to Reduce Greenhouse Gas Emissions and Increase Soil Carbon Sequestration in Grasslands of Finland, Spain and the United States, National Institute of Food and Agriculture, \$100,000—*McCulley, R.*
- MGI Herbicide-tolerant Soybeans: Evaluation of Mesotrione-based Weed Management Programs, Syngenta Crop Protection, \$12,500—*Slack, C.; Lawson, S.*
- Monsanto SO 10, Monsanto Co, \$8,960—*Slack, C.; Lawson, S.*
- Monsanto SO 11, Monsanto Co, \$7,280—*Slack, C.; Lawson, S.*
- Pale Yellow Double Crop Curing Systems, Altria Corporate Services Inc., \$18,000—*Bailey, W.*
- PEP-NBT: Product Evaluation Protocol and the Next Big Thing in Wheat Production, Kentucky Small Grain Growers Association, \$12,500—*Grove, J.; Bruening, W.*
- Performance of Small Grain Varieties in Kentucky, Kentucky Small Grain Growers Association, \$9,000—*Bruening, W.*
- Phosphorus Runoff Potential in Major Row Crop Soils of Kentucky, Natural Resources Conservation Service, \$75,000—*Lee, B.; Edwards, D.; Grove, J.; Ritchey, E.*
- Posttranscriptional Control of Responses of Plants to Elevated Temperatures, KY Science and Technology Co Inc., \$29,997—*Hunt, A.*
- Raising Soybean Yield Potential in Dry Seasons: Increased Rooting Depth and Greater Soil Water Extraction with Deeper Depth to the Fragipan, Kentucky Soybean Promotion Board, \$35,000—*Grove, J.; Ritchey, E.*
- Reducing Soybean Stress to Increase Yield, Kentucky Soybean Promotion Board, \$40,691—*Lee, C.*
- Regional Biomass Feedstock Partnership, South Dakota State University, \$25,000—*Williams, D.*
- Renewable Lubricants from Plant Oils - Ashland/UKY, Ashland Inc., \$30,000—*Hildebrand, D.*
- Renewal-Center for the Environmental Implications of Nanotechnology, Duke University, \$150,000—*Uhrine, J.; Tsyusko-Uhrine, O.*
- Resurrecting Perennial Legumes as a Livestock Feeding Strategy: An Improved High-Tannin Birdsfoot Trefoil Cultivar with Trans-Regional Potential, Auburn University, \$26,826—*Goff, B.*
- Roundup Xtend Systems Recommendations, Monsanto Co, \$11,200—*Martin, J.; Slack, C.; Lawson, S.*
- Roundup Xtend Systems Recommendations, Monsanto Co, \$11,200—*Slack, C.; Lawson, S.*
- Soft Red Winter Wheat Breeding and Variety Development for Kentucky, Kentucky Small Grain Growers Association, \$39,000—*Van Sanford, D.*
- Soil Morphology, KY Department for Public Health, \$20,000—*Karathanasis, A.*
- Soybean Oil as a High Value Fuel Cell Energy Source and Lubricant, Kentucky Soybean Promotion Board, \$27,841—*Hildebrand, D.*
- Study the Affect of Cover Crops on Soil Health and N Fertilizer Response, Natural Resources Conservation Service, \$74,955—*Coyne, M.; Grove, J.*
- Support for Student Internship with the Kentucky Soybean Variety Performance Program (2014), Kentucky Soybean Promotion Board, \$8,059—*Venard, C.*
- Sustainable Management of Vegetation on Kentucky Highway Rights-of-Way, KY Transportation Cabinet, \$260,348—*Barrett, M.*
- Synchrotron X-Ray Microprobe and Microspectroscopy Research at Low Temperature Geochemistry, University of Chicago, \$51,511—*Uhrine, J.*
- U.S. Wheat and Barley Scab Initiative's Networking and Facilitation Office and Website, Agricultural Research Service, \$252,068—*Van Sanford, D.*

Plant Pathology

Total—\$246,765

- Broadening Host Specificity in Soybean-Rhizobia Symbiosis, Kentucky Soybean Promotion Board, \$62,711—*Kachroo, A.*
- Exploring a Novel Mechanism for Pathogenic Adaptation in Fungi, KY Science and Technology Co Inc., \$30,000—*Farman, M.*
- Glycerol Metabolism and Its Role in Biotrophy versus Necrotrophy in an Arabidopsis/Fungal Hemibiotroph Model System, National Science Foundation, \$6,000—*Kachroo, P.; Kachroo, A.; Vaillancourt, L.*
- Integrated Use of Grafting Technology to Improve Disease Resistance and Fruit Yield in Specialty Melon Production, University of Florida, \$4,400—*Seebold, K.*
- Molecular, Genetic, and Biochemical Characterization of Oleate-regulated Defense Gene Expression in Plants, National Science Foundation, \$6,000—*Kachroo, P.; Kachroo, A.*
- Novel Strategies for Managing Blast Diseases on Rice and Wheat, Kansas State University, \$97,014—*Farman, M.*
- Reducing Losses to Potato and Tomato Late Blight by Enhanced Monitoring of Pathogen Populations and Improved Resistant Plants, Education and Extension, Regents of the University of California Riverside, \$15,640—*Seebold, K.*
- Southern Plant Diagnostic Network, Kentucky Component, University of Florida, \$25,000—*Vincelli, P.*

Plant Pathology—RCTF

Total—\$379,143

- Key Role of the Multifunctional Translation Elongation Factor in Virus Replication, National Science Foundation, \$204,143—*Nagy, P.*
- Mechanism of Inhibition of RNA Virus Replication by Host WW-Domain Proteins, National Institute of Allergy and Infectious Diseases, \$175,000—*Nagy, P.; Chuang, C.*

Regulatory Services

Total—\$54,889

- BSE Rule and Medicated Feed Inspections, Food and Drug Administration, \$54,889—*Harrison, G.; Green, K.*

School of HES Administration

Total—\$3,725,924

- UK Supplemental Nutrition Assistance Program Education (SNAP Ed), KY Cabinet for Health and Family Services, \$3,725,924—*Vail, A.*

Tracy Farmer Center for Sustainability and the Environment

Total—\$2,500

- Shiloh Baptist Church Community Gardens, Lexington Fayette Urban County Government, \$2,500—*Hanley, C.; Scott, D.*

Veterinary Science

Total—\$1,144,102

- Do Old Horses (>20 yrs) Have Delayed and Reduced CMI and Humoral Immune Responses to Vaccination When Compared to Adult Horses (5–15 yrs)?, Zoetis LLC, \$151,658—*Adams, A.; Chambers, T.; Horohov, D.*
- Evaluation of the Mucosal Inflammatory Response to Larvicidal Treatment, Zoetis LLC, \$13,335—*Nielsen, M.; Horohov, D.; Loynachan, A.*
- Identification of Genetic Factors Responsible for Establishment of Equine Arteritis Virus Carrier State in Stallions, National Institute of Food and

- Agriculture, \$592,335—*Balasuriya, U.; Artiushin, S.; Bailey, E.; Cook, R.; Horohov, D.; MacLeod, J.; Squires, E.; Timoney, P.; Troedsson, M.*
- Immunogenicity and Safety of RplB Vaccine in Adult Horse, University Court of the University of Edinburgh, \$13,170—*Horohov, D.*
- Optimizing Methods for Parasite Egg Isolation and Detection, MEP Equine Solutions LLC, \$27,493—*Nielsen, M.*
- Potency and Efficacy of a Novel Leptospira Vaccine in Pregnant Mares, KY Horse Racing Commission, \$52,043—*Timoney, J.*
- Student Sponsorship by Alltech for Sarah Elzinga, Alltech Biotechnology Inc., \$37,092—*Adams, A.*
- Subisotypic Differences in the Immunoglobulin G Response to *Lawsonia intracellularis* in Vaccinated, Seropositive, and Clinically Affected Horses, Boehringer Ingelheim, \$15,000—*Horohov, D.; Page, A.*
- The New Formulation of Purina Equine Senior Feed: To Determine the Effect of Different Levels of Nutritek, a Diamond V Yeast Fermentate Additive on Immune Function in Aged Horses, Purina Mills Inc., \$48,648—*Adams, A.*
- Transabdominal Ultrasonography: A Monitoring Tool for *Parascaris equorum* Burdens in Foals, Zoetis LLC, \$28,328—*Nielsen, M.; Stowe, C.*
- Zoetis Research Fellowship Award with UK Veterinary Science Fernanda Cesar, Zoetis LLC, \$165,000—*Troedsson, M.*

Multidisciplinary Grants Led by Other Colleges*

- Appalachia Community Cancer Network, National Cancer Institute, \$1,201,274—*Webber, K.*
- Appalachians Together Restoring the Eating Environment (APPAL-TREE), National Institute on Minority Health and Health Disparities, \$340,119—*Gustafson, A.; Mullins, J.*
- ARRA: Power and Energy Institute at the University of Kentucky, Department of Energy, \$1,537—*Colliver, D.*
- Campus Rain Garden Initiative: A Pilot Project for Student Stormwater Education, Lexington Fayette Urban County Government, \$22,298—*Lee, B.*
- Central Appalachian Regional Education Research Center, National Institute of

- Occupational Safety and Health, \$990,509—*Purschwitz, M.*
- Demonstration of an Algae-based System for CO₂ Mitigation from Coal-fired Power Plants, Duke Energy KY Inc., \$155,146—*Crofcheck, C.*
- FEEDER: Foundations for Engineering Education for Distributed Energy Resources, University of Central Florida, \$122,344—*Colliver, D.*
- Field Station Planning for the Ecological Research and Education Center, University of Kentucky, National Science Foundation, \$25,000—*McCulley, R.*
- Grandfamilies in Gardens, Retirement Research Foundation, \$153,381—*Vail, A.*
- Interventions in Nutrition Education and Skills, National Institute of Nursing Research, \$123,153—*Kurzynske, J.*
- KSEF RDE: Long QT Gene to Function Screens that Clarify Variants of Uncertain Significance, KY Science and Technology Co Inc., \$30,000—*Farman, M.*
- KY IDEa Network of Biological Excellence, University of Louisville, \$308,000—*Farman, M.*
- Mechanisms of Atherogenic Effects of Bisphenol A, National Institute of Environmental Health Sciences, \$225,000—*Hennig, B.*
- NSF EPSCoR: Powering the Kentucky Bioeconomy for a Sustainable Future, National Science Foundation, \$4,000,000—*Crofcheck, C.; DeBolt, S.*
- Project-Based Investigations on Improving Water Quality in the Kentucky River, KY Council on Postsecondary Education, \$130,000—*Hanley, C.*
- Southeast Center for Agricultural Health and Injury Prevention, National Institute of Occupational Safety and Health, \$1,238,273—*Hains, B.; Purschwitz, M.; Vincent, S.*
- State Water Institute Fiscal Year 2011–2015, US Geological Survey, \$92,335—*Cox, J.; Coyne, M.; Taraba, J.*
- Techno-economic and Lifecycle Evaluation of Optimized Photobioreactor- and Pond-based Microalgae Systems for CO₂ Mitigation—Topic 1, KY Energy and Environment Cabinet, \$253,000—*Crofcheck, C.*
- Unlocking Transcript Diversity via Differential Analyses of Splice Graphs, University of North Carolina, \$148,489—*MacLeod, J.*

*Only College of Agriculture co-investigators are listed.

Intellectual Property

GenBank Register

Entomology

- White, Jen. Bacterial symbionts in New Zealand weevils (*Sitona obsoletus*, *Sitona discoideus*, *Ireninus aequalis*, *Listronotus bonariensis*, *Steriphys variabilis*). Accession KJ494864–KJ494868, KJ522437–KJ522449; SRP041582.
- White, Jen. *Wolbachia* symbionts of solitary bees. Accession KP265866–KP265904.
- White, Jen. *Mermessus fradeorum* and symbionts. Accession KJ546639–KJ546647, KJ561361–KJ561380.

Kentucky Tobacco Research and Development Center

- Maiti, I.B., and D.K. Sahoo (2013). Binary plant gene expression vector pKM24KHibm10, complete sequence. Accession AKF951258.
- Maiti, I.B., and D.K. Sahoo (2013). Binary plant gene expression vector pKM24KHibm8, complete sequence. Accession AKF951257.

Plant Pathology

- Ghabrial, S.A. *Phomopsis longicolla* hypovirus isolate ME711, complete genome. Accession NC_024685.1.
- Ghabrial, S.A. *Phomopsis longicolla* hypovirus isolate ME711, complete genome. Accession KF537784.1.

- Ghabrial, S.A. *Diaporthe longicolla* genes for ITS1, 5.8S rRNA, ITS2, 28S rRNA, ITS3, ITS4, partial and complete sequence, isolate: ME711. Accession AB859015.1.
- Goodin, M.M. Coffee ringspot virus strain Lavras segment RNA1, complete sequence. Accession KF812525.1.
- Goodin, M.M. Coffee ringspot virus strain Lavras segment RNA2, complete sequence. Accession KF812526.1.
- Kachroo, A. *Glycine max* non-race specific disease resistance 1b (NDR1b), mRNA. Accession NM_001248138.1.
- Kachroo, A. *Glycine max* RIN4a protein (RIN4a), mRNA. Accession NM_001248292.1.

Kachroo, A. *Glycine max* RIN4c protein (RIN4c), mRNA. Accession NM_001248306.1.

Kachroo, A. *Glycine max* RIN4d protein (RIN4d), mRNA. Accession NM_001248323.1.

Kachroo, A. *Glycine max* RAR1 protein (RAR1-1), mRNA. Accession NM_001249629.1.

Scharidl, C.L. *Epichloe* sp. AL9924, whole genome shotgun sequencing project. Accession JFGW00000000.1.

Scharidl, C.L. *Neotyphodium aotearoe* strain ATCC MYA-1229, whole genome shotgun sequencing project. Accession JFGX00000000.1.

Scharidl, C.L. *Epichloe baconii* ATCC 200745, whole genome shotgun sequencing project. Accession JFGY00000000.1.

Scharidl, C.L. *Epichloe bromicola* ATCC 200750, whole genome shotgun sequencing project. Accession JFHA00000000.1.

Scharidl, C.L. *Atkinsonella hypoxylon* strain B4728, whole genome shotgun sequencing project. Accession JFHB00000000.1.

Vaillancourt, L.J. *Colletotrichum graminicola* CBS 130836 ITS region; from TYPE material. Accession NR_111190.1.

Vaillancourt, L.J. *Colletotrichum sublineola* CBS 131301 ITS region; from TYPE material. Accession NR_111191.1.

Vaillancourt, L.J. *Glomerella* sp. UFLAG02 internal transcribed spacer 1, partial sequence; 5.8S ribosomal RNA gene, complete sequence; and internal transcribed spacer 2, partial sequence. Accession KF604732.1.

Vaillancourt, L.J. *Glomerella* sp. UFLAG03-1 internal transcribed spacer 1, partial sequence; 5.8S ribosomal RNA gene, complete sequence; and internal transcribed spacer 2, partial sequence. Accession KF604733.1.

Vaillancourt, L.J. *Glomerella* sp. UFLAG04 internal transcribed spacer 1, partial sequence; 5.8S ribosomal RNA gene, complete sequence; and internal transcribed spacer 2, partial sequence. Accession KF604734.1.

A. Kachroo had five additional accessions. Christopher Scharidl had 207 additional accessions. L.J. Vaillancourt had 14 additional accessions.

Veterinary Science

Li, Y., S. Dangoudoubiyam, P. Henney, S. Sarkar, F. Cook, and U. Balasuriya. Full-length genome sequence of equine herpesvirus-1 T953 strain. Accession KM593996.

Howe, D.K. *Sarcocystis neurona* strain SN3 clone E1 whole genome sequence. BioProject ID PRJNA227351. Accession JAQE00000000.

Nielsen, M.K., J. Wang, R. Davis, J.L. Bellaw, E.T. Lyons, T.L. Lear, and C. Goday. *Parascaris univalens* isolate North American mitochondrion, complete genome. Accession KM216010.

Gene Expression Omnibus

Animal and Food Sciences

Cerny, K.L., W.R. Burris, J.C. Matthews, and P.J. Bridges. Neonatal testis transcriptome profiles differ among calves born to cows supplemented with different forms of dietary selenium throughout gestation. Accession GSE62382.

Cerny, K.L., W.R. Burris, M. Van Fleet, A. Slepkin, E.M. Peterson, and P.J. Bridges. Differential expression of mRNA encoding cytokines and chemokines in the reproductive tract after infection of mice with *Chlamydia trachomatis*. Accession GSE62461.

Matthews, J.C., R. Hegge, K.L. Cerny, and P.J. Bridges. Pituitary gene expression profiles of growing beef steers grazing high versus low endophyte-infected tall fescue grass. Accession GSE62570.

Cerny, K.L., and P.J. Bridges. Steroid-dependent regulation of bovine oviductal epithelial cells: A transcriptomal analysis of mRNA and miRNA. Accession GSE63969.

Patents Issued

Animal and Food Sciences

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Other Research Publications

Agricultural Economics

Burdine, K.H., R. Mosheim, D.P. Blaney, and L.J. Maynard. Livestock gross margin-dairy insurance: An assessment of risk management and potential supply impacts. Economic Research Report Number 163, U.S. Department of Agriculture.

Isaacs, S.G., K. Roe, and G. van der Hoeven. Agricultural and rural income tax education over the years: An extension education program of the land grant universities. Proceedings, International Farm Management Association's 19th Congress. Warsaw, Poland. July.

Saghaian, S., G. Ozertan, and H. Tekguc. Beef and milk price links in Turkey. Proceedings, 24th Annual World Forum and Symposium, International Food and Agribusiness Management Association (IFAMA). Cape Town, South Africa, June 16–20.

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Animal and Food Sciences

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Jang, Y. M. Lindemann, and R. Stuart. Effects of fat-soluble vitamin administration on plasma vitamin concentrations in suckling pigs. p. 30. Proceedings, Allen D. Leman Swine Conference. Minneapolis, MN. September 14–16.

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Lawrence, L.M. Horse owner's hay guide. *Progressive Forage Grower*. July.

Lawrence, L.M., B.E. Harlow, and M.D. Flythe. Antibiotics and the equine gastrointestinal tract. Proceedings, Midatlantic Nutrition Conference. Baltimore, MD.

Lindemann, M.D., and Y. Jang. Sustainable swine production through an improved understanding of feedstuffs and the animal. pp. 91–102. Proceedings, Biomin's World Nutrition Forum—Sustain:Ability. Munich, Germany. October 15–17.

Miguel, G.Z., M.H. Faria, R.O. Roca, C.T. Santos, S.P. Suman, A.B.G. Faltarone, N.L.C. Delbem, L.V.C. Girao, J.M. Homem, E.K. Barbosa, L.S. Su, F.D. Resende, G.R. Siqueira, and T.V. Savian. Immunocastration improves redness of *Longissimus thoracis* steaks from feedlot-finished crossbred (Nellore × Aberdeen Angus) cattle in Brazil. Paper 79. Proceedings, 60th International Congress of Meat Science and Technology. Punta Del Este, Uruguay. August 17–22.

Biosystems and Agricultural Engineering

Adedeji, A.A., S. Alavi, and F. Matthew. Micronutrient fortified extruded rice kernels: Impact of processing and formulation on physico-chemical attributes. ASABE Paper No. 147-P. American Association of Cereal Chemists International (AACCI). Providence, RI. October 5–8.

Alakali, J.S., S.O. Eze, P.O. Adewale, A.A. Adedeji, and M.O. Ngadi. Dynamic and steady flow behaviour of dewatered microcarpum gum solutions. ASABE Paper No. 141909304. American Society of Agricultural and Biological Engineers annual conference. Montreal, Canada. July 13–16.

Alejandro, M.M., A.A. Adedeji, and M. Ngadi. Development of an objective freshness index for an American variety of eggplant (*Solanum melongena* L. cv. *Traviata*). ASABE Paper No. 141913457. American Society of Agricultural and Biological Engineers annual conference. Montreal, Canada. July 13–16.

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Flythe, M.D., N.M. Elia, and S.E. Nokes. *Clostridium thermocellum* as biological pretreatment for switchgrass (*Panicum virgatum*) fermentation by *Clostridium saccharoperbutylacetonicum* in submerged and continuous-flow solid substrate fermentation. American Society for Microbiology 114th General Meeting. Boston, MA. May 20.

Joseph, M., A.A. Adedeji, and S. Alavi. Physico-chemical properties of fortified blended foods developed using extrusion. Institute of Food Technology (IFT), Food Engineering Division Poster Session. New Orleans, LA. June 21–24.

Joseph, M., L. Zhu, A.A. Adedeji, J. Gwirtz, S. Thiele, and S. Alavi. Adaptation of conventional wheat flour mill to refine sorghum, corn and cowpea grains. American Association of Cereal Chemists International (AACCI). Providence, RI. October 5–8.

Pomeroy, W., J. Wilhoit, and L. Swetnam. Assessing a mechanical furrow-following system to obtain multiple pass precision guidance for vegetable production. ASABE Paper No. 14–1908802. American Society of Agricultural and Biological Engineers, St. Joseph, MI.

Wan, Y., N. Wang, and T. Stombaugh. Human-subject tracking and localization for a hand hygiene monitoring system. Oral presentation at the International Conference and Exhibition of Ubiquitous Positioning, Indoor Navigation and Location-Based Services. The Institute of Electrical and Electronics Engineers (IEEE). Corpus Christi, Texas. November.

Whitford, F., S. Hawkins, M. Purschwitz, J. Earnest, D. Hynes, and K. Smith. The truck-trailer combination vehicle: Making sure the numbers add up. PPP-106. Purdue University Pesticide Program. 44 pages.

Zju, L., G.P.R. Desam, T.J. Herald, A.A. Adedeji, and S. Alvi. Effect of whey protein concentrate on dough rheology and tortilla quality parameters in corn and sorghum. Institute of Food Technology (IFT), Food Engineering Division Poster Session. New Orleans, LA. June 21–24.

Community and Leadership Development

- Barnes, J.N., and R. Epps. Barriers to implementing curriculum for agricultural science education (CASE) in secondary agricultural education programs. Annual Southern Region Association of Agricultural Educations Conference, Dallas, TX.
- Chaplin, M.S., R.B. Epps, and D. Jansen. Evaluation of motivation of curriculum for agricultural science education (CASE) lead and master teachers. North American College and Teachers of Agriculture Conference, Bozeman, MT.
- Dyk, P. Challenges of transmitting family values in multi-cultural contexts. Family Upbringing Conference, Wroclaw, Poland. May.
- Dyk, P. Community voices illuminating transformations: Turning the tide on poverty. Presentation, annual meeting of the Rural Sociological Society, New Orleans, Louisiana.
- Dyk, P. Cultural intelligence: It's essentiality in adapting to new contexts. Presentation, Fulbright Berlin Seminar, Berlin, Germany. March.
- Dyk, P. Trust: A core construct for strengthening families and building communities. Fulbright Mid-Year Conference sponsored by the Czech and Slovak Fulbright Commissions, Olomouc, Czech Republic. January.
- Emery, M., D. Kahl, and P. Lachapelle. Coaching for community: An evolving practice. Poster Session, Community Development Society Annual Conference, Dubuque, IA.
- Franklin, R.P., and S.K. Vincent. The teacher cumbine: Exploring a method of predicting pre-service teacher performance. Poster, Southern Association for Agricultural Education Research, Dallas, TX.
- Garkovich, L. Bluegrass Defiance: The emergence and growth of a grassroots resistance movement. Rural Sociological Society annual meetings, New Orleans, LA.
- Hains, B.J., K.G. Ricketts, M. Fortunato, and M. Rios. A renaissance in community education: Re-examining philosophical, educational and professional practices. Community Development Society Annual Meeting, Dubuque, IA.
- Hains, B.J., M. Rossano, B. Silvia, N.A. Knobloch, and M.A. Balschweid. Tackling difficult science concepts using 21st century pedagogy. National Association of Colleges and Teachers of Agriculture Annual Conference, Bozeman, MT.
- Hains, B.J., N.A. Knobloch, and D.R. Hains. Emotional regulation and community development: Applications for developers and their communities. International Association for Community Development Conference, Glasgow, Scotland.
- Harris, R. Where are all the black girls? Looking at U.S. girls' soccer through a comparative feminist-critical race theory lens. National Association of Sport Sociology, Portland, OR.
- Harris, R. Women organizing to reweave community in the Black Belt South: Assets and obstacles. Professional Agricultural Workers Conference, Tuskegee University, Tuskegee, AL.
- Hernden, K.D., R.B. Epps, J.L. Futrell, and K.B. Guffey. Determining the effects of teaching personal development at FFA camp. National American Association for Agricultural Education Conference, Salt Lake City, UT.
- Herndon, K.D., and R. Epps. Evaluating student outcomes at a youth leadership camp. Annual Southern Region Association of Agricultural Educators Conference, Dallas, TX.
- Hollan, M.L., and S. K. Vincent. The act of effective college teaching. Poster, Southern Association for Agricultural Education Research, Dallas, TX.
- Hustedde, R. Shaker Village report of democratic practices and community development. Prepared for Kettering Foundation, Dayton, OH. 36 pages.
- Hustedde, R.J., and M. Dehnam. E Discovery Challenge, ARC Project KY-16403-C2-2012, Final grant report for the Appalachian Regional Commission, August. 20 pages.
- Jones, K., Q. Tyler, C. Collins, and T. Cooper. Obtaining a career in higher education. Seminar, National Minorities in Agriculture, Natural Resources and Related Sciences Conference, Birmingham, AL.
- Kahl, D., M. Peterson, and D. Ivan. Stimulating a renaissance through strategic systems approach to community and economic development. Community Development Society Annual Conference, Dubuque, IA.
- Knobloch, N.A., B. Hains, L. Keefe, S. Chang, C. Espinoza Morales, M. Welsh, M. Balschweid, T. Ballard, A. Liceaga, K. Orvis, L. Snyder, M. Zanis, M. Rossano, W. Silvia, C. Brady, L.T. Esters, M. Latour, and J. Graveel. Enhancing introductory college course using educational games in animal, plant and food sciences. Published research paper, Inaugural International Congress of Innovation in Higher Education for Teaching and Learning Agriculture and Natural Resources, Universidad Nacional Agraria LaMolina, Lima, Peru.
- Namkoong, K., S. Nah, S.K. Van Stee, and R. Record. Diffusion of social media campaign effects: Moderating roles of social capital in anti-smoking campaign communications. Presented at annual meeting of Association for Education in Journalism and Mass Communications, Montreal, Canada. August.
- Ricketts, K.G., and B.J. Hains. Utilizing a professional practicum to engage rural community partners. Poster, annual meeting of Southern Rural Sociologists, Dallas, TX.
- Ricketts, K.G., B.J. Hains, and R.J. Hustedde. Partnering across borders: International collaboration in student-centered course design. Poster, annual meeting of Association for International Agricultural and Extension Education, Miami, FL.
- Ricketts, K.G., B.J. Hains, J. Barnes, and C. Cantrell. Utilizing universal design as the instructional context for student-faculty collaboration. National Association of Colleges and Teachers of Agriculture Annual Conference, Bozeman, MT.
- Ricketts, K.G., B.J. Hains, M. Rossano, N.A. Knobloch, and M. Balschweid. An exploration of the effect of instructional training on undergraduate teaching assistants in an introductory animal science course. National Association of Colleges and Teachers of Agriculture Annual Conference, Bozeman, MT.
- Russell, R.A., R.B. Epps, and J. Headrick. Life choices: Examining factors in influencing degree choice of college of agriculture freshman. Annual Southern Region Association of Agricultural Educators Conference, Dallas, TX.
- Tanaka, K. Community food security as a space for public sociology: Lessons and reflections

from Kentucky. Presentation, joint seminar by the Interdisciplinary Center for Food Security and the Department of Rural Sociology, University of Missouri, Columbia, MO.

Dietetics and Human Nutrition

- Bocage, C., H. Forsythe, and T. Philip. Evaluation of infant and young child feeding practices in Trinidad and Tobago. PowerPoint, published by the Caribbean Public Health Agency: A collaborative project with Caribbean Public Health Agency, the Ministries of Health, and the Department of Dietetics and Human Nutrition, University of Kentucky.
- Forsythe, H., V. Duke, W. Charles, and K. Whaley. Nutrition, and cancer: Food and drug interaction: A Caribbean model. Trinidad Medical Association.

Entomology

- Bessin, R., and P. Mulder. The early years of extension entomology: Celebrating Cooperative Extension's first 100 years. *American Entomologist* 60:80–83.
- Brown, G.C. Report of the consulting entomologist for the year 2014. Prepared for the Louisville Metro Public Health Dept. 12 pp.
- Brown, G.C. Results of a statewide survey of the mosquito fauna of Kentucky. Prepared for CHFS-DPH. 32 pp.
- Davidson, W., and L.K. Rieske. Emerald ash borer natural enemies are here: Can they make a difference? *Kentucky Woodlands Magazine* 9(2).
- Fox C.W., D.J. Irschick, A.K. Knapp, K. Thompson, L. Baker, and J. Meyer. Functional ecology: Moving forward into a new era of publishing. *Functional Ecology* 28:291–292. Published online: doi:10.1111/1365-2435.12254.
- Gordon, J.R., M.H. Goodman, M.F. Potter, and K.F. Haynes. Trouble brewing for bed bug insecticides? *Pest Control Technology* 42(6):72–74, 76, 78, 80.
- Potter, M.F., and K.F. Haynes. Bed bug nation: Is the United States making any progress? pp. 51–58. IN: G. Muller, R. Pospischil, W.H. Robinson, eds. *Proceedings, 8th International Conference on Urban Pests*. Zurich, Switzerland. July 20–23.
- Potter, M.F., K.F. Haynes, J.R. Gordon, L. Washburn, M. Washburn, and T. Hardin. Silica gel: A better bed bug desiccant. *Pest Control Technology* 42(8):76–81, 84.

Family Sciences

- Armes, S., and R. Werner-Wilson. The role of gender in the development of compassion fatigue. *Proceedings, National Council on Family Relations Annual Conference*. Baltimore, MD. November.
- Berry, A., D. Wise, and J.L. Hunter. You're not alone: Financial resiliency during economic recovery. *Proceedings, Family Economics and Resource Management Association Conference*. Savannah, GA. January.
- Blackburn, K., J.D. Hans, T. Parker, R. Werner-Wilson, and D. Bush. An examination of the mediating effect of attachment style on perceived concealment in marital relationships. Poster, National Council on Family Relations Annual Conference. Baltimore, MD. November.
- Frey, L.M., J. Cerel, and J.D. Hans. A phenomenological exploration of family reaction after a suicide attempt. Poster, National Council on Family Relations Annual Conference. Baltimore, MD. November.

- Frey, L.M., J. Cerel, and J.D. Hans. Does family reaction moderate the impact of suicide disclosure? Poster, National Council on Family Relations Annual Conference. Baltimore, MD. November.
- Frey, L.M., J.D. Hans, and J. Cerel. Suicide attempt survivor stigma by treatment providers and social network. Poster, National Council on Family Relations Annual Conference. Baltimore, MD. November.
- Gassova, Z., T. Werner-Wilson, and R.J. Werner-Wilson. Helping factors in filial therapy. Proceedings, American Association for Marriage and Family Therapy Annual Conference. Milwaukee, WI. October.
- Gillen, M., K. Zurlo, and H. Kim (2013). Economic status of older adults in America: Living in the new normal. NCFR Report 58(4):F15-F16.
- Harris, C., A.T. Vazsonyi, and J. Bolland. "Tit-for-tat." A study of the bidirectional relationship between parenting processes and deviance in a sample of inner-city African American youth. Proceedings, American Society of Criminology Annual Meeting. San Francisco, CA. November.
- Harris, C., A.T. Vazsonyi, G. Cui, and J. Bolland. The longitudinal reciprocal effects of religiosity and deviant behaviors in a sample of poor, inner-city African American youth. Poster, American Society of Criminology Annual Meeting. San Francisco, CA. November.
- Harris, C., and A.T. Vazsonyi. Does religious involvement decrease risky sexual behaviors? Pathways through low self-control and substance abuse. Poster, Society for Research on Adolescence Biennial Meeting. Austin, TX. March.
- Heath, C.J. Analysis of membership survey data. Proceedings, Family Economics and Resource Management Conference. Savannah, GA. January.
- Heath, C.J., and M. Gillen, guest eds. The Forum for Family and Consumer Issues: Family Economics and Resource Management (summer/fall).
- Henry, E., A.T. Vazsonyi, J. Mikuška, and A. Ksinan. "Big five" versus low self-control in the explanation of deviance: An empirical test across six cultures. Poster, Society for Research on Adolescence Biennial Meeting. Austin, TX. March.
- Hosier, A.F. Raising awareness about disabilities: A disability and age simulation. Proceedings, Under One Roof Annual Housing Conference. Fort Valley, GA. February.
- Hosier, A.F., L.S. Traywick, P. Teaster, and S. Bailey. Disseminating aging education through cooperative extension services. Symposium, Gerontology in Higher Education Annual Meeting. Denver, CO. March.
- Hosier, A.H. University of Kentucky Sanders Brown Center on Aging Alzheimer's disease 101 and healthy brain aging pre-conference workshop. Workshop, National Extension Association for Family Consumer Sciences Annual Meeting. Lexington, KY. September.
- Huff, N., and R. Werner-Wilson. Family communication: An intra- and interpersonal analysis. Poster, National Council on Family Relations Annual Conference. Baltimore, MD. November.
- Hunter, J. L., and J. Davis. Managing in tough times: Building a MONEYWISE program. Proceedings, Family Economics and Resource Management Association Conference. Savannah, GA. October.
- Hunter, J.L., and J. Davis. Managing in tough times: The evolution of a college wide extension initiative. Proceedings, Epsilon Sigma Phi National Conference. Indianapolis, IN. October.
- Hunter, J.L., and K. Stamper. It's your reality: A financial life skills simulation for college students. Proceedings, Family Economics and Resource Management Association Conference. Savannah, GA. January.
- Karaman, N., and A.T. Vazsonyi. Predictors of risky sexual behaviors among Turkish adolescents. Proceedings, European Association of Research on Adolescence Biennial Meeting. Izmir, Turkey. September.
- Lianekhammy, J., and R. Werner-Wilson. The influence of video games on adolescent brain activity. Poster, National Council on Family Relations Annual Conference. Baltimore, MD. November.
- Mikuška, J., A.T. Vazsonyi, E. Henry. The family > low self-control > deviance: Adolescents from China, Czech Republic, Slovenia, Spain, Taiwan and Turkey. Poster, Biennial Meetings of the Society for Research on Adolescence. Austin, TX. March.
- Özdemir, Y., A.T. Vazsonyi, M.M. Bell, and G. Jiskrova. Testing direct and indirect effects of maternal and paternal parenting on bullying/cyberbullying in Turkish adolescents. Proceedings, Society for Research on Adolescence Biennial Meeting. Austin, TX. March.
- Shin, S., and H. Kim. Sequences of chronic health conditions and financial outcomes: Evidence from the 18 years' data of health and retirement study health shocks. Proceedings, American Council on Consumer Interests Annual Conference. Milwaukee, WI. April.
- Thompson, A., L.M. Frey, J.D. Hans, and A. Westmoreland. Romantic relationships in the context of parenting children with autism. Proceedings, National Council on Family Relations Annual Conference. Baltimore, MD. November.
- Vazsonyi, A.T., A. Ksinan, and G. Jiskrova. Mediation effects by self-control on the parenting-deviance link in Roma and non-Roma samples. Proceedings, European Association of Research on Adolescence Biennial Meeting. Izmir, Turkey. September.
- Wise, D., B. Metzger, A. Berry, B. Shaffett, J.L. Hunter, and M. Gutter. Does anything work? Marketing a financial education course to college students. Proceedings, Family Economics and Resource Management Association Conference. Savannah, GA. January.
- Wood, N. Applying spatial statistics to couple and family relationships: Theoretical and methodological considerations. Proceedings, Theory Construction and Research Methodology Workshop. Baltimore, MD. November.
- Zamboanga, B.L., C.C. Tomaso, S.J. Schwartz, K.K. Kondo, J.B. Unger, A. Meca, A.T. Vazsonyi, S.E. Des Rosiers, L.S. Ham, E.A. Hurley, and S.K. Whitbourne. Cultural domains of acculturation and drinking games involvement among Hispanic college students: A bidimensional approach. Poster, American Psychological Association Annual Convention. Washington, DC. August.
- ## Forestry
- Adams, M.B., P. Angel, J. Burger, C. Barton, C. Zipper, and J. Skousen. Appalachian Regional Reforestation Initiative: Defining successful reforestation of mined lands. IUFRO-2nd Restoring Forests Congress. Lafayette, IN. October 14–16.
- Adkins, J.K., C.D. Barton, J.W. Stringer, and S. Grubbs. Assessment of streamside management zone efficacy for conserving benthic macroinvertebrate communities following timber harvest in Eastern Kentucky headwater catchments. SAF-Symposium of Best Management Practice Effectiveness in the Eastern U.S. Blacksburg, VA. May 12–15.
- Agha, M., B. Augustine, M.O. Murphy, J.E. Lovich, D. Delaney, J.R. Ennen, B. Sinervo, R. Cooper, and S.J. Price. Inferring seasonal activity and thermal niche of Agassiz's desert tortoises (*Gopherus agassizii*) through the application of motion sensor camera technology. 12th Annual Symposium for the Conservation and Biology of Tortoises and Freshwater Turtles. Orlando, FL. August 4–7.
- Agha, M., J.E. Lovich, J.R. Ennen, B. Augustine, T.R. Arundel, M.O. Murphy, D. Delaney, J. Briggs, K. Meyer, C. Bjurlin, M. Austin, S. Madrak, L. Tennant, and S.J. Price. Turbines and terrestrial vertebrates: Variation in tortoise survivorship between a wilderness and wind energy facility in the desert southwest, USA. 57th Annual Meeting of the Society for the Study of Amphibians and Reptiles. Chattanooga, TN. July 30–August 3.
- Agha, M., M.O. Murphy, J.E. Lovich, J.R. Ennen, C.R. Oldham, and S.J. Price. Research activities influence voiding behavior in desert tortoises (*Gopherus agassizii*). Southeast Partners in Amphibian and Reptile Conservation Annual Meeting. Lake Cumberland, KY. February 13–15.
- Agha, M., M.O. Murphy, J.E. Lovich, J.R. Ennen, C.R. Oldham, and S.J. Price. Research activities influence voiding behavior in desert tortoises (*Gopherus agassizii*). Midwest Ecology and Evolution Conference. Dayton, OH. March 1–2.
- Agha, M., M.O. Murphy, J.E. Lovich, J.R. Ennen, C.R. Oldham, K. Meyer, C. Bjurlin, M. Austin, S. Madrak, C. Loughran, L. Tennant, and S.J. Price. Research activities and winter precipitation influence voiding behavior in Agassiz's desert tortoise (*G. agassizii*). Southeast Partners in Amphibian and Reptile Conservation Annual Meeting. Lake Cumberland, KY. February 13–15.
- Agha, M., M.O. Murphy, J.E. Lovich, J.R. Ennen, C.R. Oldham, K. Meyer, C. Bjurlin, M. Austin, S. Madrak, C. Loughran, L. Tennant, and S.J. Price. Research activities and winter precipitation influence voiding behavior in Agassiz's desert tortoise (*G. agassizii*). 57th Annual Meeting of the Society for the Study of Amphibians and Reptiles. Chattanooga, TN. July 30–August 3.
- Barton, C., E. Witt, J.W. Stringer, A. Cherry, and R. Kolka. Influence of variable streamside management zones configurations on water quality following forest harvest. SAF-Symposium of Best Management Practice Effectiveness in the Eastern U.S. Blacksburg, VA. May 12–15.
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- Barton, C.D. From Butcher Holler to Monkey Broke Creek: Presentation, Restoring forests on surface coal mines. University of Kentucky-Entomology Seminar Series. Lexington, KY. March 13.
- Barton, C.D. From Butcher Holler to Monkey Broke Creek: Restoring forests on surface coal mines. SUNY-Environmental Science and Forestry Seminar Series. Syracuse, NY. February 27.
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- Biemiller, R.A., D.E. Fletcher, and C.D. Barton. Evaluating the influence of disturbance on macroinvertebrate colonization and decomposition of leaf packs in Upper Coastal Plain headwater streams. Society of Ecological Restoration, Conference on Ecological and Ecosystem Restoration. New Orleans, LA. July 28-August 1.
- Blackburn-Lynch, W., C.T. Agouridis, C.D. Barton, R.C. Warner, and T. Maupin. A hydrologic assessment of a stream created on mined lands. ASABE and CSBE/SCGAB Annual International Meeting. Montreal, Quebec, Canada. July 13–16.
- Bowker, D., J.W. Stringer, and C. Barton. Forest harvest equipment movement and sediment delivery to streams. SAF-Symposium of Best Management Practice Effectiveness in the Eastern U.S. Blacksburg, VA. May 12–15.
- Conners, T.E. Successful small hardwood sawmill marketing strategies. Presentation, Northeast Society of American Foresters chapter meeting. Nashua, NH. March 21.
- Contreras, M. 2015 annual meeting of the Council on Forest Engineering in Lexington, KY. Announcement, Council of Forest Engineering 37th Annual Meeting. Moline, IL. June 22–25.
- Contreras, M., and W. Chung. Optimizing the selection of individual trees in thinning treatments to reduce crown fire potential. Presentation, 24th IUFRO World Congress and SAF national convention. Salt Lake City, UT. October 5–11.
- Contreras, M., D. Parrott, and J.W. Stringer. Quantifying potential benefits of implementing computer generated skid trail networks. Presentation, 24th IUFRO World Congress and SAF National Convention. Salt Lake City, UT. October 5–11.
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- Devine, K., S. Fei, J.W. Stringer, and C. Barton. The effect of microsite on invasive species colonization associated with the use of timber harvesting BMPs. SAF-Symposium of Best Management Practice Effectiveness in the Eastern U.S. Blacksburg, VA. May 12–15.
- Felch, J., and J.J. Cox. The common raven in cliff habitat of the southern Appalachians: Detectability and occupancy. The Wildlife Society 21st Annual Conference. Pittsburgh, PA. October 25–30.
- Groninger, J., J. Skousen, P. Angel, C. Barton, R.J. Burger, and C. Zipper. Mine reclamation practices to enhance forest development through natural succession. Reclamation Matters. Spring 2014:40–46.
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- Hast, J.T., J.J. Cox, K. Brunjes, R.D. Crank, W.E. Bowling, and G. Jenkins. Survival and cause-specific mortality of bull elk in southeastern Kentucky. The Wildlife Society 21st Annual Conference. Pittsburgh, PA. October 25–30.
- Hast, J.T., J.J. Cox, K. Brunjes, W. Bowling, D. Crank, and G. Jenkins. Survival and cause-specific mortality of bull elk in southeastern Kentucky. The Wildlife Society, Kentucky Chapter State Conference. Barren River State Park, KY. February 20–21.
- Hildreth, A., J.J. Cox, J.T. Hast, and B. Slabach. Effects of capture metrics on blood serum profiles of elk in Kentucky. The Wildlife Society 21st Annual Conference. Pittsburgh, PA.
- Hime P.M., S.O. Nunziata, J.T. Briggler, J.S. Reece, S.J. Price, and D.W. Weisrock. Genomic approaches to *Cryptobranchus* conservation. 57th Annual Meeting of the Society for the Study of Amphibians and Reptiles. Chattanooga, TN. July 30-August 3.
- Hime, P.M., S.J. Price, and D.W. Weisrock. Genomic insights into amphibian evolution and conservation. Presentation, SUNY Buffalo Biology Department Seminar Series. Buffalo, NY. November 1.
- Hime, P.M., S.J. Price, and D.W. Weisrock. Leveraging genomics to inform *Cryptobranchus* conservation: Sex-linked genes, range-wide phylogenetics and species delimitation, and field surveys across Kentucky. Poster, Southeast Partners in Amphibian and Reptile Conservation Annual Meeting. Lake Cumberland, KY. February 13–16.
- Hime, P.M., S.J. Price, and D.W. Weisrock. Leveraging genomics to understand and conserve an imperiled North American giant salamander. Presentation, University of Kentucky EcoLunch Seminar Series. Lexington, KY. February 28.
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- Hu, L., G.A. Stainback, and C. Dillion. Economic analysis of carbon sequestration and bioenergy production under catastrophic risk and price uncertainty. Proceeding, Annual Meeting of the Southern Agricultural Economics Association. Dallas, TX.
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- Lacki, M.J., D.R. Cox, L.E. Dodd, and M.B. Dickinson. Response of northern bats to prescribed fires in eastern Kentucky forests. Workshop for Scientists and Managers: Discussing the Relationships between Fire Management and the Quality of Habitat for Bats. Mammoth Cave, KY.
- Lacki, M.J., L.E. Dodd, N.S. Skowronski, M.B. Dickinson, and L.K. Rieseke. Fire management and habitat quality for endangered bats in Kentucky's Mammoth Cave National Park during the swarming and staging periods: Predator-prey interactions and habitat use of bats threatened by white-nose syndrome. Final Report, Project #10-1-06-1. USFS Joint Fire Science Program. Published online: https://www.firescience.gov/projects/10-1-06-1/project/10-1-06-1_final_report.pdf.
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- Lewis, M.A., M. Agha, and S.J. Price. Preliminary analysis of the use of open canopy gaps by the eastern box turtle (*Terrapene.c.carolina*). Natural Resource and Environmental Science Internship/Research Forum. Lexington, KY. October 9.
- Lin, P., J. Zhang, and M. Contreras. Applying Pareto ant colony optimization to solve bi-objective forest transportation planning problems. Presentation, 15th Institute of Electrical and Electronics Engineers International Conference on Information Reuse and Integration. San Francisco, CA. August 13–15.
- Maigret, T., J. Cox, D. Schneider, C. Barton, S. Price, and J. Larkin. Effects of timber harvest within streamside management zones on salamander populations in ephemeral streams of southeastern Kentucky. SAF-Symposium of Best Management Practice Effectiveness in the Eastern U.S. Blacksburg, VA. May 12–15.
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- Maigret, T.A., and J.J. Cox. A review of best management practices and the mitigation of stream-breeding salamanders in the eastern deciduous forest. 19th Annual Central Hardwoods Conference. Carbondale, IL, March 11.
- Maigret, T.A., J.J. Cox, D.R. Schneider, C.D. Barton, S.J. Price, and J.L. Larkin. Effects of timber harvest within streamside management zones on salamander populations in ephemeral streams of southeastern Kentucky. Southeast Partners in Amphibian and Reptile Conservation Annual Meeting. Lake Cumberland, KY. February 13–15.
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- Mattingly, K., J. Lempke, R. McEwan, R. Paratley, S. Bray, and M. Arthur. Recovery of forest diversity after removal of invasive *Euonymus fortunei*. National Conference for Undergraduate Research. Lexington, KY. April 3–5.
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- McMaine, J., C.T. Agouridis, R.C. Warner, and C.D. Barton. Hydrologic characterization of a rain garden mitigating stormwater runoff from a commercial area. ASABE and CSBE/SCGAB Annual International Meeting. Montreal, Quebec, Canada. July 13–16.
- McMaine, J., C.T. Agouridis, R.C. Warner, and C.D. Barton. Hydrologic characterization of a rain garden mitigating stormwater runoff from a commercial area. Honorable Mention, Outstanding Graduate Student Oral Presentation, Oklahoma State University Student Water Conference. Stillwater, OK. April 10–11.
- Muncy, B.L., C.D. Barton, and S.J. Price. Effects of mountaintop removal and valley fill on stream salamander communities. Southeast Partners in Amphibian and Reptile Conservation Annual Meeting. Lake Cumberland, KY. February 13–15.
- Muncy, B.L., C.D. Barton, and S.J. Price. Effects of mountaintop removal and valley fill on stream salamander communities. Association of Southeastern Biologists Annual Meeting, Spartanburg, SC. April 2–5.
- Murphy, M.O., S.J. Price, and D.W. Weisrock. Host before habitat? Assessing congruency in patterns of gene flow in an imperiled freshwater mussel and its vertebrate host. Evolution. Raleigh, NC. June 21–25.
- Murphy, M.O., S.J. Price, and M.E. Dorcas. The effects of urbanization on salamander body size using a before-after control-impact design. 57th Annual Meeting of the Society for the Study of Amphibians and Reptiles. Chattanooga, TN. July 30–August 3.
- Oldham, C.R. L.J. Fleckenstein III, and S.J. Price. Novel application of passive integrated transponder (PIT) telemetry in natricine snakes. Southeast Partners in Amphibian and Reptile Conservation Annual Meeting. Lake Cumberland, KY. February 13–15.
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- Parrot, D.L., and M. Contreras. Comparison of operator-designed and computer-generated skid-trail networks. Proceedings, Global Harvesting Technology, Council of Forest Engineering 37th Annual Meeting, Moline, IL. June 22–25.
- Parrot, D.L., and M. Contreras. Comparison of operator-designed and computer-generated skid-trail networks. Presentation, Council of Forest Engineering 37th Annual Meeting, Moline, IL. June 22–25.
- Price, S.J., Muncy, B.L., and C.D. Barton. Effects of mountaintop removal and valley fill on stream salamander populations. Biology Department, Davidson College, Davidson NC. November 18.
- Price, S.J., Muncy, B.L., and C.D. Barton. Effects of mountaintop removal and valley fill on stream salamander occupancy and abundance. USFWS. Frankfort KY. July 21.
- Price, S.J., Muncy, B.L., and C.D. Barton. Effects of mountaintop removal and valley fill on stream salamanders. Water Quality Roundtable, Eastern Kentucky University. Richmond, KY. April 11.
- Reeves, C., J.W. Stringer, D. Bowker, C. Barton, and C. Agouridis. Effectiveness of elevated skid trail headwater stream crossings in the Cumberland Plateau. SAF-Symposium of Best Management Practice Effectiveness in the Eastern U.S. Blacksburg, VA. May 12–15.
- Schwager, R., A. Betancourt, J.J. Cox, E. Lyons, and M. Nielsen. Poster, Parasite prevalence in Kentucky elk as determined by fecal egg counts. Posters-at-the-Capitol, Frankfort, KY. February 27.
- Sena, K.L., C.D. Barton, C.T. Agouridis, and R. Warner. Influence of spoil type on discharged water quality and hydrologic function of experimental reforestation plots in Pike County, Kentucky. American Society of Mining and Reclamation Meeting. Oklahoma City, OK. June 14–19.
- Sena, K.L., C.D. Barton, P. Angel, C. Agouridis, S. Hall, and R. Warner. Mine spoil type influences growth of planted hardwoods and naturally colonizing understory vegetation on experimental reforestation plots in Pike County, Kentucky. IUFRO-2nd Restoring Forests Congress. Lafayette, IN. October 14–16.
- Shaffer, J.D., S.K. Gleeson, J.J. Cox, and J.L. Lhotka. The effects of mammalian herbivory on the growth of native hardwood tree seedlings of the Kentucky bluegrass blue ash-oak savanna-woodland. The Wildlife Society, Kentucky Chapter State Conference. Barren River State Park, KY. February 20–21.
- Shaffer, J.D., S.K. Gleeson, J.J. Cox, and J.L. Lhotka. The effects of mammalian herbivory on the growth of native hardwood tree seedlings of the Kentucky bluegrass blue ash-oak savanna-woodland. American Society of Plant Biologists Annual Meeting. Lexington, KY. March 29–30.
- Shaffer, J.D., S.K. Gleeson, J.J. Cox, and J.M. Lhotka. Mammalian herbivory on fourteen experimentally planted native hardwood tree seedlings of the Kentucky bluegrass savanna-woodland community. The Wildlife Society 21st Annual Conference. Pittsburgh, PA. October 25–30.
- Slabach, B., J.J. Cox, and P.H. Crowley. Partnering standard wildlife monitoring and traditional behavioral techniques: Understanding group dynamics in managed species. The Wildlife Society, Kentucky Chapter State Conference. Barren River State Park, KY. February 20–21.
- Slabach, B., J.T. Hast, K. Brunjes, P.H. Crowley, and J.J. Cox. Selective take, group dynamics, and managed species: individual and group level patterns in a gregarious megaherbivore. The Wildlife Society 21st Annual Conference, Pittsburgh, PA. October 25–30.
- Slabach, B.S., J.T. Hast, P.H. Crowley, G. Jenkins, W. Bowling, D. Crank, K. Brunjes, and J.J. Cox. Cause-specific mortality, group dynamics, and vits: Three approaches to cow elk management in Kentucky. 19th Annual Eastern Elk Management Workshop, April 27–30, Breaks Interstate Park, VA.
- Staats, W., and M. Contreras. LiDAR-derived forest canopy metrics and their influence on spatial distribution of plethodontid salamander populations. Presentation, 24th IUFRO World Congress and SAF national convention. Salt Lake City, UT. October 5–11.
- Stringer, J. Forest and chain-of-custody certification. Forest certification: From the Woods to the Mills and Beyond. Rogersville, AL. July 31.
- Stringer, J. Forest biomass: Logistics and potentials. Second Annual National Bioenergy Day. Murray, KY. October 22.
- Stringer, J. Forest certification systems and chain-of-custody at forest certification. From the Woods to the Mills and Beyond. Columbiana, AL. January 16.
- Stringer, J. Forest certification systems and chain-of-custody at forest certification. From the Woods to the Mills and Beyond. Tifton GA. April 10.
- Stringer, J. Forestry economic outlook and insect and disease update. Green River Logger Council Meeting. Hartford, KY. November 1.
- Stringer, J. Long-term storm damage. Kentucky Woodlands Magazine 9(1):1–4.
- Stringer, J. Rehabilitation of degraded hardwood stands. Society of American Foresters. Flatwoods, WV. April 1.
- Stringer, J. Understanding the certified supply chain. Kentucky Woodlands Magazine 9(1):20–21.
- Stringer, J., B. Ammerman, and B. Thomas. K. IN: Heidemann and W. Snell, eds. *Forestry. 2014–2015 Agricultural Situation and Outlook*. University of Kentucky, College of Agriculture. Lexington, KY.
- Weatherford, M., C.T. Agouridis, C.D. Barton, R.C. Warner, and K.L. Sena. Long-term hydrologic characteristics of loose-dumped mine spoils. ASABE and CSBE/SCGAB Annual International Meeting. Montreal, Quebec, Canada. July 13–16.
- Weatherford, M., C.T. Agouridis, C.D. Barton, R.C. Warner, and K.L. Sena. Long-term hydrologic characteristics of loose-dumped mine spoils. Oklahoma State University Student Water Conference. Stillwater, OK. April 10–11.

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Yang, J. Changbai Mountain International Eco-forum. Changbai Forest Reserve Bureau. Changbai Mountain, China. September 12.

Yang, J. International Workshop of Spatial Technology Applications in Environment Management. Osaka University and Hokkaido University. Sapporo, Japan. March 24.

Yang, J. Research Salon of Principals, Models, and Practices of Landscape Ecology. Nanjing University. Nanjing, China. August 5.

Yang, J. Young Ecologist Summit. Annual Conference of Ecological Society of China. Shenyang, China. September 18.

Yang, Y., C.R. See, R.D. Yanai, and M.A. Arthur. Sampling intensity and uncertainty in litterfall mass and nutrient flux in northern hardwoods. *Ecological Society of America Annual Meeting*. Sacramento, CA. August 10–15.

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Goff, B.M. The role and importance of forage legumes in pastures. *Proceedings, 15th Kentucky Grazing Conference*. Bowling Green, KY. October.

Green, J.D. Johnsongrass management in soybeans. Multi-state fact sheet, *Herbicide-Resistance Take Action Campaign*, sponsored by United Soybean Board.

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Arnold, L.M. Blue green algae and botulism. Presentation, *Spencer County Beef Association*. Taylorsville, KY. May 5.

- Arnold, L.M. Bovine viral diarrhea virus. Cow Country News. March.
- Arnold, L.M. Bovine viral diarrhea virus: regulations concerning a "PI" calf. Cow Country News. June.
- Arnold, L.M. Bovine viral diarrhea virus: What is "PI"? Off the Hoof. May.
- Arnold, L.M. Brazilian beef in the US. Off the Hoof. February.
- Arnold, L.M. Brazilian beef in the US? What about foot and mouth disease? The Progressive Cattleman, North Central Edition. April.
- Arnold, L.M. Brazilian beef in the US? What about foot and mouth disease? Cow Country News. February.
- Arnold, L.M. BVD informational webinar via Lync with Dr. Bob Stout (KY state veterinarian). From Lexington, KY. May 8.
- Arnold, L.M. BVD refresher. Presentation, Winter Food Animal Conference. UKVDL, Lexington, KY. February 26.
- Arnold, L.M. BVD-PI and value of a necropsy. Presentation, Hardin County Cattlemen's Meeting, Elizabethtown, KY. October 23.
- Arnold, L.M. BVD-PI review and value of a necropsy. Presentation, Southern States Advanced Livestock Feedmaster Program. Richmond, VA. November 19.
- Arnold, L.M. Calf diarrhea-new research into oral electrolyte therapy. The Progressive Dairyman 14. August.
- Arnold, L.M. Careers in veterinary medicine. Presentation, Careers Class-UKY. Lexington, KY. October 6.
- Arnold, L.M. Chronic pneumonia in stocker calves due to *Mycoplasma bovis*. Off the Hoof. November.
- Arnold, L.M. Chronic pneumonia in stocker calves due to *Mycoplasma bovis*. Cow Country News. November.
- Arnold, L.M. Cold Stress and Newborn Calves. Kentucky Dairy Notes. February.
- Arnold, L.M. Cold stress and newborn calves. Off the Hoof. January.
- Arnold, L.M. Cow signals. Presentation, Casey County Dairy Meeting, Liberty, KY. December 22.
- Arnold, L.M. Deworming decisions. Presentation, Madison County Beef Association. Richmond, KY. July 17.
- Arnold, L.M. Dystocia. Presentation, Kenton County Reproductive Efficiency Meeting, Covington, KY. January 8.
- Arnold, L.M. FAMACHA training. Presentation, Sheep and Goat Development Annual Meeting, Cave City, KY. October 25.
- Arnold, L.M. FAMACHA training. Presentation, Small Ruminant Grazing Conference. Lexington, KY. February 1.
- Arnold, L.M. Fluid therapy in neonatal calves. Presentation, UKVDL Faculty Seminar. Lexington, KY. August 8.
- Arnold, L.M. Forage disorders. Presentation, Master Grazer. Versailles, KY. May 21.
- Arnold, L.M. Functions of the UKVDL, anaplasmosis, and pinkeye. Presentation, Cow College. Lexington, KY. Aug. 8.
- Arnold, L.M. Grass tetany. Presentation, Harrison County Cattlemen Meeting, Cynthiana, KY. April 7.
- Arnold, L.M. Harmful algal blooms: Are my cattle in danger? Cow Country News. August.
- Arnold, L.M. Harmful algal blooms: Are My Cattle in Danger? Kentucky Dairy Notes. August.
- Arnold, L.M. Harmful algal blooms: Are my cattle in danger? Off the Hoof. July.
- Arnold, L.M. Intravenous fluid therapy in neonatal calves. Presentation, Summer Food Animal Conference. Lexington, KY. Aug. 14.
- Arnold, L.M. IV fluid therapy in calves. Presentation, Morehead Clinic Days, Buffalo Trace Veterinary Meeting, Morehead, KY. May 31.
- Arnold, L.M. Ketosis in sheep: Cyanide potential following frost. Presentation, Multi-species Grazing Demonstration. Adolphus, KY. October 17.
- Arnold, L.M. LongRange antibiotic strategies, judicious use of antibiotics, and calf scours. Presentation, Rockcastle County Winter Beef Series. Mt. Vernon, KY. February 6.
- Arnold, L.M. Managing the dry cow to prevent mastitis. The Progressive Dairyman 9. September.
- Arnold, L.M. Managing the Dry Cow to Prevent Mastitis. The Progressive Dairyman 1 Northwest Insert. January.
- Arnold, L.M. Mastitis treatment protocols. Presentation, Southeast Quality Milk Initiative Annual Meeting, Blacksburg, VA. September 21.
- Arnold, L.M. Parasite resistance and LongRange. Presentation, Bourbon County Winter Beef Meeting. Paris, KY. January 22.
- Arnold, L.M. Pinkeye prevention. Presentation, Henry County Regional Cattlemen's Field Day, Henry Co, KY. October 1.
- Arnold, L.M. Receiving and testing of beef replacements in the cow herd. Presentation, KY Beef Conference. Lexington, KY. October 30.
- Arnold, L.M. Roundtable discussion on BVD-PI. KVMA Mid-America Veterinary Conference. Louisville, KY. September 19.
- Arnold, L.M. Scours and fluid therapy in calves. Presentation, Rowan County Cattlemen's Association. Morehead, KY. December 2.
- Arnold, L.M. Stocker/backgrounder considerations. Presentation, Lincoln County Backgrounders Meeting, Stanford, KY. March 24.
- Arnold, L.M. The esophageal feeder—A life-saving tool for calves. Kentucky Dairy Notes. December.
- Arnold, L.M. The esophageal feeder—A life-saving tool for calves. Off the Hoof. December.
- Arnold, L.M. The esophageal feeder—A life-saving tool for calves. Cow Country News. December.
- Arnold, L.M. The VetCap treatment method for horn fly control. Off the Hoof. September.
- Arnold, L.M. Vaccination of the market calf (preweaning). Presentation, Northern KY Beef Reproductive Efficiency Program. Kenton County, KY. April 30.
- Arnold, L.M. Vaccination protocols at weaning. Presentation, Grant County Fall Feeder Calf Management Class. Williamstown, KY. Sept 15.
- Arnold, L.M. Vaccine protocols for cow-calf producers via Lync. Presentation, Clay County Cattlemen's Meeting. From Lexington, KY. April 24.
- Arnold, L.M. Vaccine protocols for spring. Presentation, Taylor County Beef Meeting. Campbellsville, KY. April 10.
- Arnold, L.M. Vaccine protocols via Lync. Presentation, Grayson County Beef Producers. From Lexington, KY. March 13.
- Arnold, L.M. Value of a dead animal. Presentation, Southern States Basic Livestock Feedmaster Program. Lexington, KY. October 29.
- Arnold, L.M. What Do You Do With Your Dead Animals? Cow Country News. July.
- Arnold, L.M. What do you do with your dead animals? Off the Hoof. June.
- Arnold, L.M. What to look for in an oral electrolyte product. The Progressive Dairyman 5. March.
- Arnold, L.M., and A. Nielson. Press release. Cattle producers need to watch out for grass tetany. April.
- Arnold, L.M., and A. Nielson. Press release. Take care of lactating livestock in extreme cold. January.
- Arnold, L.M., and A. Nielson. Press release. Take precautions to help newborn calves survive bitter cold. January.
- Arnold, L.M., and A. Nielson. Press release. Winter took a toll on cattle health. March.
- Arnold, L.M., and J. Lehmkuhler. What's in your balage? Inadequate fermentation may lead to health risks. Cow Country News. May.
- Arnold, L.M., and Jeff Lehmkuhler. What's in your balage? Inadequate fermentation may lead to botulism. Off the Hoof. April.
- Arnold, L.M., and L. Pittman. Recent winter weather conditions impact Kentucky cow/calf herds and producers. Off the Hoof. March.
- Arnold, L.M., and L. Townsend. The VetCap® treatment method for horn fly control. Cow Country News. September.
- Carter, C.N. A memorial for Dr. James H. Steele—One Health leader. Presentation, J.V. Irons Luncheon, Diseases in Nature Conference. Irving, TX. June 27.
- Carter, C.N. Animal health, human health, One Health: The life and legacy of Dr. James H. Steele. Presentation, Commemorative session for James H. Steele, American Public Health Association Annual Meeting. New Orleans, LA. November.
- Carter, C.N. Enhanced veterinary diagnostic capabilities for the 21st century. Presentation, Gluck Equine Research Center Foundation Board of Directors. Oct 7.
- Carter, C.N., ed. Diagnostic Laboratory Rounds. Kentucky Veterinary News. Spring, Summer, Fall, Winter editions.
- Cassone, L. The equine necropsy: A sensitive but important topic. The Horse. November 26.
- Gaskill, C.L. Clinical pearls: Toxic tidbits that backyard chickens eat: What you don't know could hurt you (and your chickens!). Presentation, Zoetis-Kentucky Poultry Federation Backyard Poultry Symposium. Lexington KY.
- Gaskill, C.L. Large animal toxicology case studies. 36th Annual Morehead Clinical Days Veterinary Conference. Morehead KY. May/June.
- Gaskill, C.L. Unapproved compounded drug alert. Bluegrass Equine Digest (May): 4
- Gaskill, C.L., and L.L. Smith. Update on serum cobalt testing in racehorses. American Academy of Veterinary and Comparative Toxicology, 57th Annual Conference of the American Association of Veterinary Laboratory Diagnosticians. Kansas City, MO. October.
- Gaskill, C.L., and M. Nielsen. Moxidectin intoxication in foals and brain moxidectin concentrations. American Academy of Veterinary and Comparative Toxicology, 57th Annual Conference of the American Association of Veterinary Laboratory Diagnosticians. Kansas City, MO. October.

Higgins, S., K. Schmidt, and M. Arnold. How to prevent harmful algal blooms (HABs). *Cow Country News*. October.
Lea, K., C.L. Gaskill, and R. Smith. Tall fescue testing: Understanding the numbers. *Bluegrass Equine Digest* (April): 7–9.

Veterinary Science

Adams, A.A. Tips for preparing your older horse for winter. *Bluegrass Equine Digest*, October. Published online: http://www.thehorse.com/eneews/bluegrass-equine-digest/PDF/BED-Oct2014.pdf?utm_source=Newsletter&utm_medium=bluegrass-equine-digest&utm_campaign=10-26-2014.

Ball, B.A., I.F. Canisso, and M.H.T. Troedsson. Progress towards new biomarkers for the diagnosis of bacterial placentitis in mares. *Equine Disease Quarterly* 23(1):4–5.
Chambers, T., et al: OIE expert surveillance panel on equine influenza vaccine composition: Conclusions and recommendations. *OIE Bulletin* 2014-2:77–79. Published online: <http://www.oie.int/en/our-scientific-expertise/specific-information-and-recommendations/equine-influenza/>.
Dwyer, R.M. Commentary. *Lloyd's Equine Disease Quarterly* 23(4):1.
Graves, K.T. DNA testing in horses. *Gypsy Horse World* 12(1):18–19.

Nielsen, M.K. A new breed of funding. *The Horse* 31(7):50.
Nielsen, M.K. Diatomaceous earth as a dewormer? *Equus* 439:79–80.
Slater, J., K. Bourchers, T. Chambers, A. Cullinane, V. Duggan, D. Elton, L. Legrand, R. Paillot, D. Lussot, and G. Fortier. Report, International Equine Influenza Roundtable Expert Meeting, Le Touquet, Normandy, February 2013. *Equine Veterinary Journal*. Published online: doi:10.1111/evj.12302.
Woodward, E.M., and M.H.T. Troedsson. Endometritis in old mares. Proceedings, 8th International Conference on Equine Reproductive Medicine. p. 241.

Graduate Degrees

Degrees listed are from the 2014 spring semester, 2014 second summer session, and 2014 fall semester.

Ph.D. Dissertations

Agricultural Economics

Ahmadin, Muhammad S. Essays on the value of a firm's eco-friendliness in the financial market.
Hartell, Jason G. Earthquake risk in Indonesia: Parametric contingent claims for humanitarian response and financial institution resiliency.
Li, Xiaoguan. The effects of food safety standards on trade and welfare: The case of EU shrimp imports.

Animal and Food Sciences

Tanner, Sara L. Evaluating dietary amino acid adequacy in horses using isotopic techniques.

Biosystems and Agricultural Engineering

E, Xinyi. Nutrients recycling strategy for microalgae-based CO₂ mitigation system.

Entomology

Gordon, Jennifer R. Insecticide resistance in the bed bug.
Wulff, Jason. The role of the bacterial endosymbiont *Arsenophonus*, in the soybean aphid, *Aphis glycines*.

Family Sciences

Akande, Katrina Ann Romaine. Parenting: What's it like for black fathers with nonresident children?
Lianekhammy, Joann. The influence of video games on adolescent brain activity.

Plant Pathology

Li, Hua. RNA sequence determinants of a coupled termination-reinitiation strategy for translation of downstream ORF in *Helminthosporium victoriae* virus 190S and other victoriviruses (family Totiviridae).
Anderson, Gavin Lloyd Franklin. Nuclear import and interactions of potato yellow dwarf virus nucleocapsid, matrix, and phosphoprotein.
Pan, Juan. Ether bridge formations and chemical diversification in loline alkaloid biosynthesis.
Xu, Kai. Key roles of sub-cellular membranes and co-chaperone in tombusvirus replication.

Plant and Soil Sciences

Crop Science

Dvorjak, Daniela. Fusarium head blight resistance and agronomic performance in soft red winter wheat population.
Williamson, Jessica. Animal and pasture responses to grazing management of chemically suppressed tall fescue in mixed pastures.

Soil Science

Ghezzi, Jessique. Soil and biosolid nano- and macro-colloid properties and contaminant transport behavior.
Yang, Yang. Field-scale water and solute transport.

Plant Physiology

Bell, Stephen. Understanding the chemical gymnastics of enzyme catalyzed 1'-1 and 1'-3 triterpene linkages.

Veterinary Science

Claes, Anthony N.J. Anti-müllerian hormone in stallions and mares: Physiological variations, clinical applications and molecular aspects.
Cook, Deborah G. Use of genomic tools to discover the cause of champagne dilution coat color in horses and to map the genetic cause of extreme lordosis in American Saddlebred horses.
Frederico Canisso, Igor. Studies on equine placentitis.
Gautam, Ablesh. Examination of the SnSAG surface antigen gene family in *Sarcocystis neurona*.
Janes, Jennifer Gail. The roles of orthopaedic pathology and genetic determinants in equine cervical stenotic myelopathy.
Sanz, Macarena G. Evaluation of the susceptibility and humoral immune response of foals to *Rhodococcus equi* infection.
Sarkar, Sanjay. Modulation of type-1 interferon mediated immune response: A novel innate immune evasion strategy of equine herpesvirus 1.
Tiwari, Ashish. Role of viral and host factors in influenza virus mediated inhibition of interleukin-23.

M.S. Theses

Agricultural Economics

Hu, Lijiao. Economic analysis of carbon sequestration under catastrophic risk and price uncertainty in Kentucky.
Meas, Thong. The effects of country of origin image and patriotism on consumer preference for domestic versus imported beef.
Sagbo, Nicaise Sheila Mahutin. Economic analysis and willingness-to-pay for alternative charcoal and clean cook stoves in Haiti.
Sene, Seydina. Food imports under foreign exchange constraints in the CFA's Franc Zone of Sub-Saharan Africa (SSA).
Wan, Wei. Farmers' willingness to pay for breeding sow insurance: Evidence from China's Hubei Province.
Williamson, Sara. A multivariate analysis of consumers' beliefs, attitudes, and behaviors associated with locally produced food and farmers' market patronage.

In addition, two non-thesis master's degrees were awarded in calendar year 2014.

Animal and Food Sciences

Cox, Traci Jane. The acoustic emissions produced by *Escherichia coli* during the growth cycle.
Egert, Amanda M. Effect of dietary exposure to ergot alkaloids on contractility of bovine mesenteric vasculature and rumen motility.
Garbacik, Stefani R. Gestational form of supplemental selenium (Se) affects steroidogenic gene expression in the newborn calf testis.
Hansen, Tayler L. Modeling digestibility and rate of passage in horses.
Jia, Yang. Interaction of isoflavones and endophyte-infected tall fescue seed extract on vasoactivity of bovine mesenteric vasculature.
O'Niones, Kevin J. Rheological, foam, and physical properties of low sucrose meringue and angel food cake formulated with non-nutritive sweeteners and polydextrose.
Thomas, Amanda Shaw. An assessment of two feed additives to improve feed utilization in pigs.
Wadsworth, Barbara Alice. The impact of dual chamber cow waterbeds as a freestall base.
Whitehouse, Catherine. Evaluation of a novel feedstuff for horses.

Wingard, Sheryl. Effect of direct-fed microbials and monensin on in vitro rumen fermentation.

Biosystems and Agricultural Engineering

Élia, Noelia M. Sequential co-culture of anaerobic bacteria on switchgrass in a continuous flow-through reactor for biofuel production.

Enlow, Holly K. Evaluating sampling strategies for rainfall simulation studies and surface transport of antibiotics from swine manure applied to fescue plots.

Gray, Mary Kathryn. Alkaline hydrogen peroxide pretreatment for its use in an on-farm bioprocessing facility.

Mains, Timothy. Using tryptophan fluorescence to monitor yogurt culture fermentation and predict endpoint.

McMaine, John T. Hydrologic characterization of a rain garden mitigating stormwater runoff from a commercial area.

Turner, Aaron. Laboratory scale concept validation and evaluation of compromising plant nodal integrity as a means to increase bale density.

Weatherford, Mary Deicher. Storm hydrograph characteristics and curve numbers of loose-dumped mine spoil in Eastern Kentucky.

In addition, two non-thesis master's degrees were awarded in calendar year 2013.

Community and Leadership Development

Hill, John C. Drumming away drugs: An innovative alternative towards drug rehabilitation.

Long, Kelli A. Conceptualizing citizen journalism: Definitions and roles.

Roberts, Amanda P. Organic and locally grown food preferences of adults in Kentucky.

Signon, Bonnie S. Effectiveness of a farm field trip.

Vance, Leah K. Family influences on the educational aspirations of female youth in Appalachia.

In addition, three non-thesis master's degrees were awarded in calendar year 2014.

Dietetics and Human Nutrition

Adams, Bailey R. Exploring the relationship between emotional brain training, stress, depression, food addiction, and weight.

Cunningham, Kailey M. Study abroad opportunities for dietetics and human nutrition students: Expectations, benefits and barriers.

Farnsworth, Lila N. Factors in breastfeeding initiation among central Kentucky WIC and non-WIC participants.

Najor, Jean M. Promoting healthy, home-cooked meals: Formative research for a social marketing program targeting low-income mothers.

Perkins, Sarah G. Farmers' market shopping behaviors and the association of fruit and vegetable intake.

Roberson, Lauren B. Examining reasons for low fidelity to educational programs in patients with gestational diabetes: A qualitative study.

Schwartz, Aaron K. The effect of a nutrition education program on nutrition knowledge, dietary intake, body composition and perceived sport performance among high school athletes.

Smith, Shawn S. Cortisol, physical activity, and weight loss in a randomized clinical trial.

Vaught, Joy A. Exploring new approaches for weight loss maintenance: Intuitive eating and emotional brain training.

West, Crystal D. Food shopping habits and the association with diet.

Entomology

Stroh, Christopher. Changing litter resources associated with hemlock woolly adelgid invasion affect benthic communities in headwater streams.

Saeed, Abiya. Characterizing the maternally inherited endosymbionts of solitary bees.

Whitney, Thomas. Exploring the links between seasonal variation and spider foraging.

Yu, Tian. Computational identification and molecular verification of miRNA in eastern subterranean termites (*Reticulitermes flavipes*).

Family Sciences

Arnes, Stephanie. The mindfully attached therapist: Factors that predict and prevent the development of compassion fatigue.

Dooley, Brigitte A. Attitudes toward assisted reproductive technology: The effects of gender, relationship status, age, and sexual orientation.

Ernsberger, Staci. Death acceptance in widowhood.

Gresham, Haley. Practice patterns of equine assisted psychotherapists.

Hellman, Joanne N. Social and psychological factors related to the career exploration process of young adults.

Hendricks, Katelyn B. Graduates' perspectives on transition from college graduation to the workplace: A qualitative approach.

Setari, Ryan R. Summative evaluation of the high school financial planning program in rural Kentucky.

Sonntag, Courtney E. A guy walks into a bar...: Exploring clients' preferences for humor and ratings of therapy sessions.

Thompson, Amber A. Romantic relationships in the context of parenting children with autism.

Forestry

Muncy, Brenee. The effects of mountaintop removal mining and valley fills on stream salamander communities.

Sena, Kenton. Influence of spoil type on afforestation success and hydrochemical function on a surface coal mine in eastern Kentucky.

Sanderson, Tyler. Monitoring the influence of acid deposition and soil and implications to forest health in the Daniel Boone National Forest.

Horticulture

Mizin, Kavita. Nutrient cycling, plant productivity and plant microbe interactions in organic seasonal high tunnel systems.

Plant Pathology

Aljawasim, Baker Diwan Getheeth. Evaluation of PCR-based methods for rapid, accurate detection and monitoring of *Verticillium dahliae* woody hosts by real-time polymerase chain reaction.

Plant and Soil Sciences

Keene, Tom. Switchgrass yield and quality with multiple fertilizer applications and harvest dates.

Monin, Whitney. Improving methods for successful establishment of switchgrass.

Graduate Enrollment

Note: Graduate enrollment data are from the UK Office of Institutional Research <http://www.uky.edu/IR/student.html>

	2013	2014	net change
Agricultural Economics			
Master's	20	23	3
Doctorate	32	27	-5
Major Total	52	50	-2
Animal and Food Sciences			
Master's	39	32	-7
Doctorate	18	18	0
Major Total	57	50	-7
Biosystems and Agricultural Engineering			
Master's	22	22	0
Doctorate	5	10	5
Major Total	27	32	5
Entomology			
Master's	14	11	-3
Doctorate	20	20	0
Major Total	34	31	-3
Family Sciences			
Master's	23	21	-2
Doctorate	28	24	-4
Major Total	51	45	-6
Forestry			
Master's	18	18	0
Doctorate*			0
Major Total	18	18	0
Retailing & Tourism Management			
Master's	8	7	-1
Doctorate*			0
Major Total	8	7	-1
Dietetics and Human Nutrition			
Master's	21	22	1
Doctorate*			0
Major Total	21	22	1
Plant Pathology			
Master's	2	2	0
Doctorate	15	14	-1
Major Total	17	16	-1
Plant and Soil Sciences/Horticulture			
Master's	31	28	-3
Doctorate	46	43	-3
Major Total	77	71	-6
Rural Sociology/Career, Technology and Leadership Education			
Master's	36	37	1
Doctorate*	7		
Major Total	43	37	1
Veterinary Science			
Master's	6	6	0
Doctorate	18	18	0
Major Total	24	24	0
Grand Total	429	403	-19

*Degree type not offered.

Sparks, Bret. Reduced inputs turfgrass through white clover inclusion.

Weber, Daniel. Grassland sustainability in Kentucky: Case studies quantifying the effects of climate change on slug herbivory in pastures and different home lawn systems on turf greenhouse gas emissions.

Integrated Plant and Soil Sciences

Davis, David. Evaluating the effect of maturity on intake and digestibility of switchgrass hay consumed by beef steers.

Lea, Krista. Tall fescue ergovaline concentration based on sample handling and storage method.

Oostveen, Emily. The role of surface chemistry in the toxicity of manufactured cerium dioxide nanoparticles to *Caenorhabditis elegans*.

Williams, Alexandra. Plant growth regulators and herbicides for management of *Poa annua*: Impact of biotypes and behavior of flurprimidol in turf grass species.

Crop Science

Li, Qing. Bacteria in bioethanol fermentation.

Mitchell, Laura. Boron nutrition of burley and dark tobacco.

Richmond, Mitchell. Evaluation of correlation between within-barn curing environment and TSNA accumulation in dark air-cured tobacco.

Simon, Michelle. Over-seeding forages to improve drought stresses Kentucky pastures.

In addition, two non-thesis master's degrees were awarded in calendar year 2014.

Retailing and Tourism Management

Huston, Tabitha. Identification of soils on firefighter turnout gear from the Philadelphia fire department.

Burrows, Elvis. Board governance of world-class annual sport championships: Learning from Kentucky to create tourism opportunities in the Bahamas.

Sengupta, Aniket. Brand analyses of global brand versus local brand in Indian apparel consumer market.

In addition, three non-thesis master's degrees were awarded in calendar year 2014.

Financial Statement

Statement of Federal Formula Funds

Fiscal Year 2014

Income

Federal Funds	
Hatch	4,628,416
Hatch Multi-State	1,422,500
McIntire-Stennis	643,385
Animal Health	47,926.00
Total Federal Funds	6,742,226
State Funds	
Total State Funds	27,662,855
Total Funds	34,405,081

Expenditures

	Federal	State	Total
Personal Services	5,469,396	22,156,007.96	27,625,404
Travel	121,587	540,905.26	662,493
Other Operating Expenses	858,126	4,577,343.39	5,435,469
Equipment	293,118	388,598.39	681,716
Total Expenditures	6,742,226	27,662,855	34,405,081

Staff

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Departments

Following are departmental faculty and leadership lists for calendar year 2014. (R) denotes Experiment Station appointment.

Agricultural Communications

Skillman, L.M., Director

Agricultural Economics

Maynard, L.J., Professor and Chair (R)
Batte, M.T., Research Professor
Brown, R., Senior Lecturer
Burdine, K.H., Assistant Extension Professor
Dasgupta, S., Adjunct Assistant Professor
Davis, A., Associate Extension Professor
Davis, T.D., Assistant Extension Professor
Dillon, C., Professor (R)
Freshwater, D., Professor (R)
Gorton, W.T., Adjunct Assistant Professor
Halich, G., Assistant Extension Professor
Hu, W., Professor (R)
Isaacs, S., Extension Professor
Katchova, A., Associate Professor (R)
Kusunose, Y., Assistant Professor (R)
Mark, T., Assistant Professor (R)
Meyer, A.L., Extension Professor
Reed, M.R., Professor (R)
Robbins, L.R., Professor (R)
Saghaian, S., Associate Professor (R)
Schieffer, J.K., Assistant Professor (R)
Simon, M.E., Adjunct Assistant Professor
Skees, J.R., Professor (R)
Snell, W.M., Extension Professor
Stowe, C.J., Associate Professor (R)
Woods, T.A., Extension Professor
Zheng, Y., Assistant Professor (R)

Animal and Food Sciences

Coffey, R.D., Extension Professor and Chair
Aaron, D.K., Professor (R)
Aiken, G.E., Adjunct Associate Professor
Amaral-Phillips, D.M., Extension Professor
Anderson, L.H., Extension Professor
Andries, K.M., Adjunct Assistant Professor
Ao, T., Adjunct Assistant Professor
Bewley, J.M., Associate Extension Professor
Boatright, W.L., Professor (R)
Boling, J.A., Professor (R)
Brennan, K.M., Adjunct Assistant Professor
Bridges, P.J., Assistant Professor (R)
Bullock, K.D., Extension Professor
Burriss, R., Extension Professor
Cantor, A.H., Associate Professor (R)
Camargo, F.C., Associate Extension Professor
Coffey, R.D., Extension Professor
Coleman, R.J., Associate Extension Professor
Cox, N.M., Professor and Dean
Cromwell, G.L., Professor (R)
Dawson, K.A., Adjunct Professor
Ely, D.G., Professor (R)
Flythe, M.D., Adjunct Assistant Professor
Harmon, D.L., Professor (R)
Harmon, R.J., Professor (R)
Heersche, G., Jr., Extension Professor
Hennig, B., Professor (R)
Hicks, C.L., Professor (R)
Klotz, J.L., Adjunct Assistant Professor

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

Biosystems and Agricultural Engineering

Nokes, S.E., Professor and Chair (R)
Adediji, A.A., Assistant Professor (R)
Agouridis, C.T., Associate Professor (R)
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Epps, R., Assistant Professor (R)
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Rossi, A., Lecturer

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