AR-130

University of Kentucky
College of Agriculture,
Food and Environment
Agricultural Experiment Station

The Kentucky
Agricultural Experiment Station

130th

Annual Report
2017

To His Excellency
The Honorable Andy Beshear
Governor of Kentucky

I herewith submit the one hundred and thirtieth annual report of the Kentucky Agricultural Experiment Station for the period ending December 31, 2017. 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,

Rick Bennett
Associate Dean for Research
Director, Agricultural Experiment Station
Lexington, Kentucky

Lexington, Kentucky

May 20, 2021

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
UK Research and Education Center at Princeton
UK Veterinary Diagnostic Laboratory
USDA Agricultural Research Service Forage Animal Production Research Unit
Veterinary Science

Contents

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 2017. 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

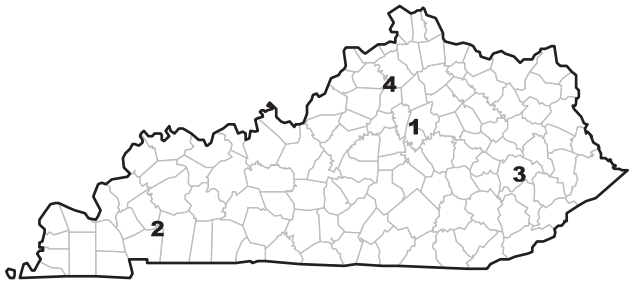
In 2017, research activities of the Kentucky Agricultural Experiment Station were conducted at Lexington, Princeton, Quicksand, and Owenton and in counties throughout the state. Efforts are constantly made to ensure that the research studies have application to the problems of all Kentucky farmers and 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 technologies 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 agricultural production for the benefit of Kentucky farmers. The program 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 discovering new plant natural products with potential for commercialization. The program includes resources devoted to research on industrial hemp, including variety evaluation and production research.

KTRDC research facilities include field plots, laboratories, greenhouses, and contained growth facilities for plant breeding, plant analysis, disease screening, and genetic engineering research. The goal is to utilize these resources to preserve and strengthen agriculture in Kentucky, and in particular tobacco agriculture. The KTRDC program emphasizes applications-oriented research designed to facilitate the development of new crop-based businesses and technologies for Kentucky agriculture.

Research Program

The KTRDC research program is comprised of seven fully supported in-house research programs and six research programs that are housed in the KTRDC building and receive partial KTRDC support. Within KTRDC, there is expertise on plant breeding, the development of molecular markers, applied field research, plant genomics, plant genetic engineering, and tobacco analytical research. KTRDC supported 49 specific research projects/programs in 2017. In addition, KTRDC offers a competitive grants program that encourages and supports research collaborations. Thirteen research projects were funded through this program, totaling $100,000 in direct support. Progress reports and research results for each of these projects/programs can be found in the KTRDC annual report for 2016.

KTRDC has considerable resources and infrastructure dedicated to analyzing tobacco and tobacco products. Much of the support for this research effort comes from two cooperative agreements between KTRDC and the FDA Center for Tobacco Products, totaling over $15 million. These funds have been utilized to establish the Center for Tobacco Reference Products (CTRP) within KTRDC. The CTRP provides reference tobacco products as standards for tobacco and tobacco product analyses. CTRP research focuses on constituent measurement and method development. The reference products are a necessary tool for measuring and reporting constituents as required by the Family Smoking Prevention and Tobacco Control Act and are sold to the tobacco research community throughout the world. As part of our research program, the CTRP has initiated a proficiency testing program to validate constituent measurement by laboratories and to help establish accepted methods for measuring physical and chemical properties of tobacco and tobacco products. Seven rounds of proficiency testing have been completed, with three rounds conducted in 2017.

In 2017, the KTRDC/CTRP laboratory analyzed 4,620 tobacco samples, 1,387 fescue samples, and 173 industrial hemp samples in support of various research projects. In addition, the proficiency testing program conducted three proficiency testing rounds with participation by tobacco analytical labs from around the world. The proficiency testing included:

- **CIG-2017A–Elements 12-13**: Proficiency test for formaldehyde, acetaldehyde, acetone, acrolein, propionaldehyde, crotonaldehyde, 2-butanone, n-butyraldehyde, puff count, and physical parameters. The physical properties of the test material included resistance to draw, total ventilation, filter ventilation, pressure drop (closed), tobacco weight, cigarette weight, air permeability, firmness, circumference, length–cigarette, length–filter plug, and length–tipping paper.
- **CIG-2017B–Elements 1-2**: Proficiency test for TPM, nicotine, CO, water, NFDPM (tar), puff count, and physical parameters. The physical properties of the test material included cigarette resistance to draw (pressure drop open), cigarette resistance to draw (pressure drop closed), filter pressure drop (fully encapsulated), total ventilation, filter ventilation, tobacco weight, cigarette weight, air permeability, firmness, circumference, length–cigarette, length–filter plug, and length–tipping paper.
- **CIG-2017C–Elements 3-6**: Proficiency test for NNK (4-(methylnitrosamino)-1-(3-pyridyl)-1-butanone, NNN (N-nitrosonornicotine), NAT (N-nitrosoanatabine), NAB (N-nitrosoanabasine), and BaP (Benzo[α]pyrene), TPM, puff count, and physical parameters. The physical properties of the test material included cigarette resistance to draw (pressure drop open), cigarette resistance to draw (pressure drop closed), filter pressure drop (fully encapsulated), total ventilation, filter ventilation, tobacco weight, cigarette weight, air permeability, firmness, circumference, length–cigarette, length–filter plug, and length–tipping paper.

Research Activities

KTRDC Projects

- Production and Development of High and Low Converter Burley Tobacco Seed
- Production and Development of High Converter Dark Tobacco Seed
- Preliminary Testing of the TN 90 Alkaloid Series
- Investigation Into TN 90H and LA Burley 21 Offtypes
- Preliminary Testing of Low Alkaloid Burley and Flue-Cured Lines
- Evaluation of the Efficacy of HP400 in Reducing TSNAs
- The Effects of Pre-Harvest Quercetin Application on the Accumulation of Tobacco-Specific Nitrosamines
- The Effects of Cytokinin Application on the Accumulation of Tobacco-Specific Nitrosamines
- Sample Preparation for TSNA Analysis
- Effect of Seeding Rate on Harvestable

Components of Industrial Hemp and Varieties
- Varieties and Production Practices to Maximize Nicotine to be Utilized in Emerging Tobacco Products
- Genomic Mapping and Nucleotide Variation in Nicotiana Benthamiana
- Characterization of Small RNA Molecules in Tomato Spotted Wilt Virus-Resistant Tobacco Plants Expressing Gene-Silencing Constructs that Target Specific TSWV Genes
- KTRDC Analytical Laboratory
- Development of Recombinant Inbred Lines (RILs) Population to Identify Molecular Markers in Marker-Assisted Selection (MAS) for Tobacco Breeding
- Accelerated Storage Stability Testing and Analysis of Metals in Tobacco Reference Products
- Effects of a Chemical Suckercide on Tobacco Gene Expression

Faculty Research Support

- Hormone and Stress Regulation of Tobacco Growth

Summit and Externally Funded Projects

- The Effect of Genetically Reduced Alkaloids on TSNA Accumulation
- The Effect on TSNAs of Stick Spacing in the Barn
- Impact of the Absence (Genetic Knockdown) of Cembratriene-Diols from the Surface of Tobacco Leaves on the Disease Development and Insect Infestation in the Field
- Preliminary Research: Field Trial of Genetically Engineered Tobacco Lines Capable of High Oil Accumulation for Biofuel Applications
- Determination of Optimal Industrial Hemp Varieties for Kentucky Farmers
- Determination of the Enantiomers of Nicotine and Nornicotine in Cured Tobacco Leaf
- Development of Tobacco Plants with Ultralow Alkaloid Content by Targeted Mutation of Structural Genes Involving Nicotine Biosynthesis
- Enhancing Capability of KTRDC in Performing Analysis of Chemical Constituents in Raw Tobacco, Cigarette Filler and Mainstream Smoke
- Frogeye Leaf Spot Management Programs Evaluated Under Pressure from a Reduced-Sensitivity Pathogen Population
- Interactions Between Algae and Pythium spp. in Tobacco Transplants
- Evaluation of the Efficacy of HP400 in Reducing TSNAs
- The Effects of Pre-Harvest Quercetin Application on the Accumulation of Tobacco-Specific Nitrosamines
- Suppression of Black Shank Disease in Burley Tobacco by Treatment of Transplant Water with Sclareol, During Setting
- Suppression of Axillary Buds Formation Through Manipulation of the Branched1 Gene in Tobacco
- Development of Early Maturing Black Shank Resistant Burley Tobacco Varieties
- The Effect of Forced Air During Air-Curing of Burley Tobacco on TSNAs
- Characterization of Trichoderma Induced Systemic Resistance in Tobacco
- Enhancing Burley Tobacco Production Labor Efficiency
- Optimizing the Integration of Annual Forages into Tobacco Systems
- The Effects of Cytokinin Application on the Accumulation of Tobacco-Specific Nitrosamines
- Sample Preparation for TSNA Analysis
- Accumulation of Benzo[α]Pyrene and TSNAs During Fire-Curing
- Accumulation of Benzo-α-Pyrene and TSNAs During Fire-Curing
- Varieties and Production Practices to Maximize Nicotine to be Utilized in Emerging Tobacco Products
- Effects of Seed Size and Seed Coating on Germination, Emergence, Establishment, and Seedling Vigor in Industrial Hemp
- The DNA Sequence of the Burley Tobacco Genome
- Improving Tobacco Water-Use Efficiency Through Manipulation of Stomatal Density
- Elucidation of Variation in Conversion of Nicotine to Nornicotine within Tobacco Varieties
- Development of SNP-Based Molecular Markers Linked to NlRPT, a Dominant Gene for Blue Mold Resistance in Nicotiana Langsdorffii
- Production of Foundation Seed and Maintenance of LC Standards

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 and 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 (1) to ensure accurate and equitable exchange between dairy producers and processors; and (2) to 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.

The activities in the division are performed by a dedicated and professional staff that 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 also 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, including pet food. Feed labels are evaluated to identify purpose of feed, guaranteed composition, ingredient list, feeding directions, and the need for any warning or caution statements. A strong feed regulatory program not only provides the consumer with safe and effective products but supports a level playing field for Kentucky businesses.

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"). Since September 2016, Kentucky has been a national leader in the Animal Feed Regulatory Program Standards (AFRPS) initiative, a joint effort by the American Association of Feed Control Officials (AAFCO) and the FDA to help build a more robust integrated food safety system by concentrating on regulation of animal feed production. This cooperative agreement will bring $3,000,000 into the division and the university over the next five years.

Highlights

- Our division is responsible for regulation of a diverse state feed industry that includes more than a thousand Kentucky businesses involved in the manufacture and/or distribution of animal feed.
- Our inspectors conducted 1,061 official inspections at Kentucky feed manufacturers and dealers in 2017.
- Our division processed 3,417 animal feed samples and performed over 34,000 lab analyses. Of these samples, 3,103 were classified as official samples and product guarantees were compared to lab analyses.
- Pet food sampling continues to be a major focus of our division with 1,385 pet food samples collected in 2017.
- Unofficial samples included 104 service samples provided by Kentucky consumers, feed dealers, or manufacturers and were analyzed at no charge by our laboratory to answer a question or address a complaint.
- Other unofficial samples included 25 feed samples from quality control programs, 16 university research samples, and 8 samples provided by other state regulatory programs.
- Our laboratory used 45 different approved analytical methods in providing results.
- Under our contract with FDA for the 2016–2017 fiscal year, inspectors conducted 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. This FDA contract brings approximately $50,000 annually to the division.
- At the end of 2017, over 20,000 feed products were registered for sale in Kentucky and 1,336 registered feed manufacturers were offering feed products for sale in the state.

Our program is partially supported by income from inspection fees and product registration. During the period of July 1, 2016, to June 30, 2017, total income for the feed program was $1,303,336.89. Inspection fees are assessed at $0.35/ton, and annual registration of $50.00 is collected for products sold exclusively in packages of 10 or fewer pounds.

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 1,070 visits to perform inspections and to sample agricultural, lawn, turf, and garden fertilizer at Kentucky processing, wholesale, and retail locations
- Administered actions on 2,623 official and 9 unofficial samples of fertilizer involving more than 6,950 chemical tests
- Issued stop-sale orders on 206 official fertilizer samples, which resulted in penalties of more than $81,000 that were reimbursed back to famers or discounted at the time of sale
- The official samples represented about 50,896 tons out of the approximately 1,039,790 tons of fertilizer distributed in Kentucky during 2017, or about 4.89 percent
- Reviewed labels and registered over 5,500 products from 450 firms and issued licenses to 187 companies that manufactured custom-blended fertilizers
- Analyzed laboratory check sample materials from Magruder®, UAN, and AFPC
- 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, 2016, to June 30, 2017, was $781,241. Fertilizer products are assessed an inspection fee of 50 cents per 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 pro-

vide a variety of services to Kentucky dairy producers, processors, and allied industries. Our laboratory provides milk testing services to support research projects within the college. The milk program also operates a laboratory that is available for Kentucky producer, processor, and handler service testing and that cooperates with both USDA and FDA to provide analytical services when the need arises.

Highlights

- Reviewed applications and issued licenses to 1 transfer station, 27 milk handlers, 16 laboratories, 71 technicians, and 290 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 38 sampler-weighers and 8 technicians
- Conducted 8 pay-record and 15 raw milk receiving audits
- Conducted 36 milk laboratory inspections
- Conducted 307 sampler-weigher inspections and analyzed milk samples from 1,832 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 samples to the 16 licensed laboratories and 2 other labs to ensure accurate component-analysis procedures
- Provided analyses for Kentucky small processor cheese makers (43 samples)
- Created bulk tank calibration charts, a unique service, for 39 dairy producers, including 15 Kentucky producers (at no charge)

The income from fees and licenses received from July 1, 2016, to June 30, 2017, was $151,163.95. 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 940 visits to perform inspections and to sample agricultural, lawn, turf, and garden seeds at Kentucky seed processing, wholesale, and retail locations
- Collected and tested 1,773 official seed samples
- Issued stop-sale orders on 285 official seed samples and 52 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 218 permits to label agricultural seed and 57 permits to label vegetable and flower seed
- Registered 640 seed dealers and 31 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. The income from fees, permits, and licenses received from July 1, 2016, to Jun 30, 2017, was $346,797. 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 and seed counts; determines test weight; performs accelerated aging; conducts fluorescence testing on ryegrass; determines moisture content; conducts tetrazolium 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.

Highlights

- Analyzed 2,489 service samples
- Collaborated with researchers to analyze 76 seed samples
- Collaborated with AOSA to analyze 28 referee seed samples
- Supported the equine and livestock pasture management programs in analyzing 205 plant samples for endophyte
- Analyzed 29 hemp samples in accordance with new KDA hemp program
- Analyzed 31 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, 2016, to June 30, 2017, was $53,076.00.

Soil Testing Laboratory

Soil testing provides agricultural producers, homeowners, greenhouse operators, and others with valuable information on the fertility status of their soils or greenhouse media. The laboratory works in partnership with the University Cooperative Extension Service to provide laboratory results and lime and fertilizer recommendations. We also offer analyses of animal wastes and nutrient solutions used to supply nutrients to agronomic and horticultural crops. The philosophy behind our recommendations is to optimize economic benefit to the producer by maximizing crop yield, minimizing input costs, and maintaining fertile soil.

In the laboratory-supported research programs throughout the UK College of Agriculture, 6,483 samples were tested at a cost of $112,000. Our analyses help support research that improves on information to benefit crop production and environmental stewardship.

Soil samples analyzed and changes from 2016.

Type	Number	% change
Agriculture	28,963	-12
Home lawn and garden	9,893	7
Commercial horticulture	1,067	23
Greenhouse media	115	117
Atrazine residue in soil	17	-11
Animal waste	289	-26
Nutrient solution	74	-13
Soil nitrate	30	-87
Research samples	6,483	-3
Total	46,931	-6

The program received $266,707 in income for service testing during the period from July 1, 2016, to June 30, 2017.

The soil test website is at soils.rs.uky.edu. The number of samples analyzed in 2017 with the percent change from 2016 is shown in the table.

Kentucky Department of Agriculture Partnerships

Partnerships were developed with Kentucky Department of Agriculture for testing agricultural limestone and hemp. Testing limestone began in fall 2016 and continued through 2017. Hemp testing began in 2017.

Agricultural limestone was tested for relative neutralizing value, which is important for producers to assess limestone quality from a quarry. The relative neutralizing value is used in soil test reports generated from the division's soil test laboratory to supply tailored limestone recommendations based on the quarry the lime is coming from. In fall 2007, calcium and magnesium concentration in lime was added to the analyses to provide additional information to producers on nutrient inputs in their production. A cooperative agreement was developed for fiscal year 2017–2018 for $12,400.

Hemp testing began in July 2017 to support the state's pilot program for hemp production allowed by the 2015 Farm Bill. The psychoactive compound, THC, was analyzed to verify that the concentration was below the allowed level of 0.399 percent. A total of 314 samples were tested. A cooperative agreement was developed for payment to occur on a per-sample basis for a total of $26,859 in 2017.

UK Research and Education Center at Princeton

The University of Kentucky Research and Education Center (UKREC) is an integral part of the Kentucky Agricultural Experiment Station and the Kentucky Cooperative Extension Service. The faculty and staff of the UKREC are dedicated to sustaining the long heritage of meaningful impact and achievement by addressing the rapidly changing issues and challenges associated with Kentucky agriculture and rural communities. The center's 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.

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 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 1,500 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 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, disease resistance, and profitability; 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.

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. After insect and plant pests are identified, specialists give advice on integrated pest management strategies to control them.

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 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 2,000 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.

Activities

Agricultural Economics

- Provided current market situation and outlook for corn, soybeans, and wheat
- Analyzed pre-harvest and post-harvest price risk management strategies for corn, soybeans, and wheat
- Simulated multi-year benefits of crop insurance and price risk management on farm cash flow and financial ratios for a low-cost/low-debt farm and a high-cost/high-debt farm to demonstrate the benefit of risk management in preserving working capital and operating credit
- Analyzed the effect of changes to crop insurance subsidies to farm risk and returns and potential changes to crop mix for 1,500-, 2,500-, and 5,000-acre grain farms
- Simulated potential risk protection provided by potential farm program in advance of drafting the new farm bill

Animal and Food Sciences—Beef Cattle

- Form of selenium on progesterone levels in cycling cows
- Long-term effects of form of selenium on multigenerational physiological capacity
- Regulation of controllers of EAAC1 to enable efficient nutrient metabolism
- Year-round mineral intake in beef cattle

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
- Effect of aeration on pack factors for corn and soybean during storage
- Collaborated with scientists and industry partners in Nigeria to reduce post-harvest grain losses during storage at the farm and small-holder level (bag storage in warehouses) and in silo complexes (bulk storage)
- Provided train-the-trainer programs in Ghana to reduce post-harvest grain losses along the value chain
- Investigated drying and storage technologies to reduce post-harvest losses of grains in Ghana
- Revised "Storage" chapter in *Midwest Plan Service Handbook on Grain Drying, Handling and Storage* (MWPS-13)

Entomology

- Survey of exotic insects in soybean, orchards, vineyards, and nurseries
- Using insect pheromone traps to predict outbreaks of moths for field crops
- Survey of kudzu bugs in soybeans and kudzu plants
- Survey of aphids and barley yellow dwarf virus in wheat (collaborating with Carl Bradley)
- Efficacy tests for soybean insecticide seed treatments
- Studying the dispersion of the brown marmorated stink bug in western Kentucky
- Identifying ambrosia beetles on nurseries (collaborating with Winston Dunwell).
- Management of the sugarcane aphid on field, forage, and sweet sorghum.
- Evaluation of slug damage in soybeans.

Forages

- Alfalfa variety test
- Red clover variety test
- Tall fescue variety test
- Orchardgrass variety test
- Sorghum-sudangrass variety trial
- Pearl millet variety trial
- Sudangrass variety trial
- Forage sorghum variety trial
- Summer annual diversity study
- Kentucky Grazing School
- Kentucky Fencing School
- Alfalfa and Stored Forage Conference
- Kentucky Grazing Conference

Grain Crops

- Applying late-season nitrogen to soybean with pivot irrigation systems in western Kentucky
- Late season nitrogen for dryland soybean production
- Sulfur trials in winter wheat
- Evaluation of ammonium thiosulfate for corn production
- Understanding components to high yielding soybean
- Phosphorus response trials: How does spatial scale influence plant response?
- Wheat field schools
- Barley variety trial
- Intensive management of double-crop soybean to maximize yield and profitability
- Hulless barley variety trial
- Soybean and wheat seed company tours
- Soybean variety trials
- Cereal rye and hybrid cereal rye agronomic production studies
- Agronomic studies to reduce vomitoxin accumulation in wheat
- Evaluation of grain harvest timing on wheat yield, profitability, and vomitoxin accumulation
- Evaluation and selection of early generation wheat breeding material
- Wheat variety trial
- Wheat vernalization and plant development trial
- Developing model to predict winter wheat growth stage
- Winter wheat starter fertilizer trial
- Winter wheat plant growth regulator trials
- No-till wheat management
- Corn variety trial
- Testing of wheat breeding lines
- Wheat fusarium head blight nursery

Horticulture

Sustainable Nursery/Landscape Research

- Integrated pest management (IPM) monitoring (ambrosia beetle)
- PlantPoint™ moisture sensor irrigation controller evaluation
- Maintaining water quality and efficient irrigation of nursery crops
- Landscape plant evaluations: Breeders, Industry, and SERA-27 Regional Project
- Plant container evaluation for sustainable production
- Efficient fertilization of nursery crops
- Kentucky native plant evaluation, production protocols, and use

Fruit

- NC-140 rootstock trials: apple and peach
- Cultivar trials: peach and blackberry
- Sweet cherry rootstock observation and UFO training system demonstration trial
- Small fruit demonstration plots
- Pecan variety demonstration
- Blueberry fruit production in aboveground containers with moisture sensor irrigation and fertility monitoring and control

Vegetables

- Broccoli vegetable production variety trial
- Sentinel cucurbit downy mildew trial

Manure Management and Use

- The use of rock salt, gypsum, and/or poultry litter to increase rooting depths in fragipan soils
- Poultry litter, biosolids, and composted swine manure used for winter wheat and corn production
- Poultry litter use for corn and soybean production
- Nitrogen dynamics with broadcast and injected poultry litter

Plant Disease Diagnostic Laboratory

- The laboratory diagnosed 1,068 routine plant specimens. (Searchable annual summaries of PDDL diagnoses are available at http://plantpathology.ca.uky.edu/extension/diagnostic-laboratories/plant-disease-diagnostic-laboratory-annual-reports.)

Plant Pathology

- Soybean fungicide, nematicide, and biological efficacy testing
- Corn fungicide and biological efficacy testing
- Wheat fungicide efficacy testing
- Integrated management of fusarium head blight of wheat and barley
- Integrated management of frogeye leaf spot of soybean
- Race survey of *Phytophthora sojae*, causal agent of Phytophthora root rot of soybean in Kentucky
- Evaluation of corn fungicide application timings on management of southern rust of corn
- Characterization of corn hybrids for resistance to common foliar diseases of corn
- Fungicide resistance research on soybean and corn pathogens
- Monitoring for diseases of grain crops
- Implementation of the iPiPE system for southern rust monitoring in corn

Soil Science

- Remediation of the fragipan to increase soil productivity: Greenhouse trials with ryegrass + soybean rotation; wheat + soybean rotation; ryegrass + sodium fluoride; ryegrass + KCl; ryegrass + KCl + NaCl; ryegrass + $NaNO_3$; ryegrass + corn rotation; ryegrass + humate; festulolium; ryegrass + leonardite
- Remediation of the fragipan to increase soil productivity: Field trials with gypsum; calcium carbonate lime; calcium silicate lime; sodium nitrate; calcium nitrate; potassium nitrate; ryegrass cover crop; ryegrass + sodium fluoride; wheat; humate with and without ryegrass; KCl at different rates with and without ryegrass. On-farm evaluation of fields with a history of ryegrass use
- Evaluation of urease inhibitors in corn production
- Long-term tillage for corn, wheat, and double crop soybean production

Soil Test Laboratory

- The laboratory tested 18,120 soil samples for growers, precision agriculture consultants or companies, and UK Extension/research personnel.
- Presentations and/or lab tours were given to The Young Farmers Association, 4-H leadership groups, extension staff assistants, and precision agriculture customers interested in the soil testing process
- In collaboration with the horticulture department, the lab contributed to and will be further participating in a Sustainability Challenge Grant

Tobacco

- Tobacco transplant production: plastic float tray evaluation
- Dark fire-cured commercial variety test
- Dark air-cured commercial variety test
- Burley commercial variety test
- Burley regional quality trial
- Insecticide performance for tobacco hornworm, budworm, flea beetle, and aphid control
- Regional sucker control trials for burley and dark tobacco
- Comparison of potassium sulfate and potassium chloride sources for dark tobacco
- Dynamics of benzo-α-pyrene and nitrosamine accumulation during fire-curing
- CORESTA dark fire-cured and dark air-cured tobacco pesticide residue tests
- Evaluation of bactericides for angular leaf spot (*Pseudomonas* spp.) control in dark tobacco
- No-till and strip-till tobacco production demonstrations
- Feasibility of chemical topping in burley tobacco
- Evaluation of organic nitrogen sources for dark tobacco
- Effect of pre-topping maleic hydrazide application on alkaloid production in dark tobacco
- Effect of foliar calcium addition in tobacco where Ca is deficient according to tissue tests

Weed Science

- Comparison of horseweed (*Conyza canadensis*) control in glyphosate-, glufosinate-, and dicamba-resistant soybean
- ALS-resistant ryegrass control in winter wheat
- Pinoxiden and glyphosate resistance screening of two Kentucky Italian ryegrass populations

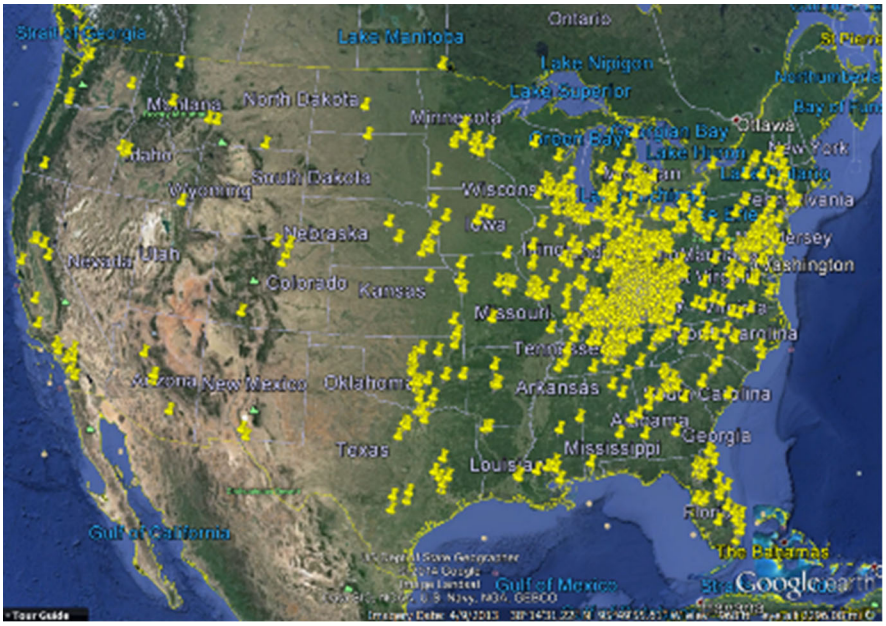
UK Veterinary Diagnostic Laboratory

The University of Kentucky Veterinary Diagnostic Laboratory (UKVDL) serves as one of the premier veterinary diagnostic laboratories in the United States, providing timely and accurate services in support of the practicing veterinary profession, livestock agriculture, the signature equine industries, the poultry industry and backyard flock operations, companion animals, wildlife, and zoo animals. The 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 is charged with safeguarding the health of animal agriculture in Kentucky via veterinary diagnostic testing and disease identification/confirmation.

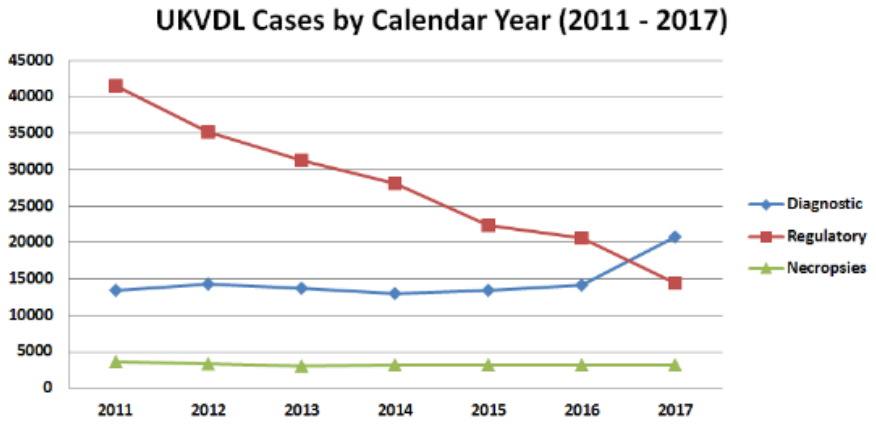
As the state's flagship veterinary diagnostic laboratory, the UKVDL's primary goal is to develop, apply, and utilize validated, state-of-the-art veterinary diagnostic testing methods and scientific knowledge to improve animal health and marketability, preserve the human-animal bond, and help protect and improve public health through the early and accurate identification of and passive surveillance for zoonotic diseases. The UKVDL laboratory is fully accredited to the ISO 17025 standard 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 piroplasmosis, West Nile virus, chronic wasting disease of deer, contagious equine metritis, and bovine spongiform encephalitis (mad cow disease) to assure that animals can move freely in the markets, slaughter houses, breeding sheds, sale barns, and events. As an active member of the National Animal Health Laboratory Network (NAHLN), the laboratory conducts ongoing proficiency testing to confirm the presence of foreign animal diseases (FADs) such as foot and mouth disease, high path avian influenza, and classical swine fever. UKVDL also hosts a rich continuing education and outreach program for our clients and the public every year.

Farmers and animal owners utilize 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. UKVDL faculty, scientists, and technical staff are specialists in several diagnostic medical disciplines directly related to animal health to include bacteriology, clinical pathology, epidemiology, extension, molecular biology, pathology, serology, toxicology, and virology. Laboratory findings are reported back to the submitting veterinarian who then consults with his or her clients to implement a treatment or prevention protocol to manage disease problems on the premise. A state-of-the-



Locations of clients submitting accessions to UKVDL, 2012-2017.



Graphics by Dr. Jacqueline Smith.

	Diagnostic	%Change	Regulatory	%Change	Necropsies	%Change
2011	13491		41538		3645	
2012	14227	5.5%	35093	-15.5%	3398	-6.8%
2013	13655	-4.0%	31251	-10.9%	3100	-8.8%
2014	12976	-5.0%	28142	-9.9%	3227	4.1%
2015	13493	4.0%	22319	-20.7%	3208	-0.6%
2016	14082	4.4%	20682	-7.3%	3258	1.6%
2017	20823	47.9%	14502	-29.9%	3202	-1.7%

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

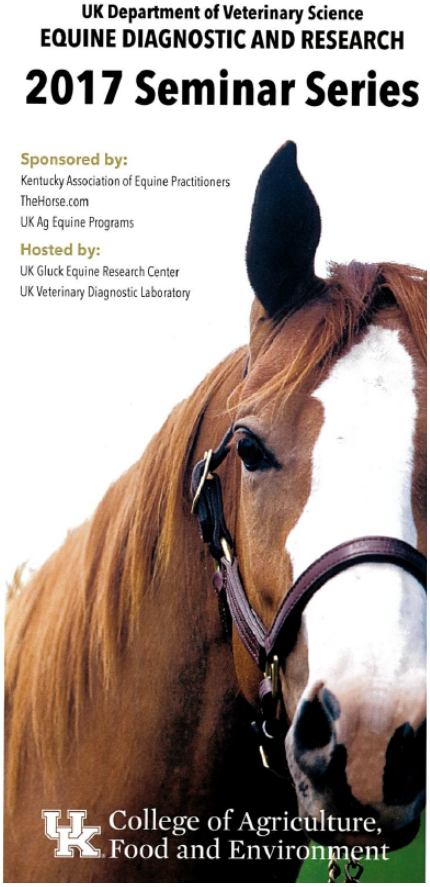
Disease diagnostic services are coordinated by specialists in the appropriate disciplines. Complex clinical cases involving multiple sections are monitored by the Head of Diagnostic Services with trained case coordinators as alternates. During high-volume surge testing periods (seasonal testing and disease outbreaks), cross-trained technicians are assigned to busy sections as needed to assure that the workload can be managed in a timely and accurate fashion.

The UKVDL received 20,823 clinical diagnostic cases (+47.9% over calendar year 2016) and 14,502 regulatory cases (down 29.9% over calendar year 2016). The decreasing trend in regulatory cases is due primarily to changes in state, federal, and international requirements and the establishment of new labs that can perform the testing (i.e. increased commercial competition). The necropsy caseload of 3,202 cases decreased slightly (by 1.7% for calendar year 2017). The diagnostic and necropsy accession caseload fluctuates based on seasonal and natural epidemiologic conditions, and events such as emerging diseases, drought, inclement weather, and secular changes in disease incidence. Total test trends in each laboratory section are listed in the individual section reports.

Vision

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

The 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 is charged with safeguarding the health of animal agriculture in Kentucky via veterinary diagnostic testing and disease identification/confirmation.



The UKVDL confirms infectious diseases, parasitic diseases, chemical and biological intoxicants, and other toxic contaminants that may harm animals or humans. In addition, the laboratory conducts regulatory testing that allows for the movement of animals domestically and internationally in the export markets. The laboratory 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 in accordance with the ISO 17025 standard. Each employee of the UKVDL focuses on performing all tasks according to protocol with a total commitment to quality.

Mission

The UKVDL'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 to protect the public health in the true spirit of One Health.

Objectives

Every employee of the UKVDL is committed to quality, integrity, and excellence in all work completed. To achieve our mission, 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 the quality of diagnostic test results
- Integrate contemporary laboratory practices throughout the laboratories
- Ensure employee health and safety
- Provide employees with training and tools to improve QA/QC

The UKVDL's success is measured by customer satisfaction, meeting professional standards and the essential American Associate of Veterinary Laboratory Diagnosticians (AAVLD) Accrediatation requirements, and our response to service demands. These quality objectives and trends are reviewed regularly to assure quality improvement in laboratory services.

Outreach

The UKVDL continues to build and enhance outreach programs throughout the Commonwealth. The Kentucky Vet-LabNet listserv distributes animal health bulletins to a list of more than 2,500 clients, scientists, farmers, and stakeholders. The UKVDL web site at www.vdl.uky.edu is continuously updated with information relating to diagnostic testing, epidemiologic surveillance data, near real time GIS maps of disease distribution, and more.

Social media was implemented in 2016 to engage clients and potential clients via Facebook and Twitter. Statistics that reflect public awareness of UKVDL services are monitored.

The UKVDL faculty and staff contribute articles quarterly to the KVMA journal, the Kentucky Cattleman Association *Cow Country News*, the *Bluegrass Equine Digest, Equine Disease Quarterly*, and other publications.

The UKVDL director, faculty, and staff deliver lectures at scientific and lay meetings. Dr. Michelle Arnold, ruminant Extension veterinarian, planned and hosted the 7th Summer Food Animal Conference at the UKVDL on August 17. The near-monthly Equine Diagnostic-Research Seminar Series at the UKVDL continued for its 12th year. These seminars are filmed by *The Horse* magazine and made available as webinars that are viewed in more than sixty countries.

Other outreach events included:

- Winter Food Animal Practitioner Conference, February 16, UKVDL Auditorium, with 85 veterinarians and other guests in attendance
- Summer Food Animal Practitioner Conference, August 17, UKVDL Auditorium, with 70 veterinarians and other guests in attendance
- The director and seven UKVDL employees attended the AAVLD meeting in San Diego, California, for continuing education and delivering scientific presentations
- UKVDL director, who serves as executive director of the World Association of Veterinary Laboratory Diagnosticians, helped plan the June 2019 biennial meeting in Chang Mai, Thailand
- Third annual meeting of the Center for Animal and Human Health in Appalachia, Griffin Gate Hotel, Lexington, October 9–10

See section reports for additional outreach activities.

Achievements

- Led UKVDL efforts to maintain national accreditation in the American Association of Veterinary Laboratory Diagnosticians (every five years, most recent full accreditation approved in 2016), faculty and staff continuring medical education initiatives, and participation in outbreak response.
- Continued support for faculty and staff to enhance the UKVDL outreach programs through one-day symposia and seminars such as food animal (Dr. Michelle Arnold), equine (all faculty), and toxicology (Dr. Cindy Gaskill). The monthly Equine Diagnostic Research Seminars reach a global audience through our partnership with *The Horse* magazine.
- Worked closely with Mr. Ryan Redimarker, UKVDL business office manager, to provide a clear vision and oversight for a UKVDL strategic and marketing plan to improve client services, enhance testing and collection of fees, and to purchase high value instrumentation to modernize our laboratory sections. Fees for UKVDL services have doubled in the past ten years.
- Director served as key liaison with Lincoln Memorial University leaders to sustain our cooperative agreement to provide training for veterinary medical students in exhange for significant funds that can be used to improve UKVDL services and research capabilities in support of Kentucky animal agriculture.
- UKVDL epidemiologist Dr. Jackie Smith continues development and dissemination of the near real-time interactive GIS animal disease monitoring project to include thematic map products for over 25 years of rabies data in Kentucky. Drs. Carter and Smith made a resolution to the AAVLD/USAHA at the annual meetings in San Diego to consider adopting the Kentucky monitoring system nationwide.
- Continue to provide support for faculty and staff to travel to professional meetings for continuring education and to host professional exhibits for display at local, state, and national meetings as needed.
- Supported and guided Dr. Jackie Smith in fostering the growth of KY-Vet-LabNet listserv. Involved over 2,500 subscribed clients to maintain a high level of situational awareness for veterinarians and farmers through alerts and bulletins.
- Continue to oversee epidemiological field investigations/research studies for clients as requested/needed, generating intramural and extramural funding for the UKVDL.
- Regular articles published in the Journal of Kentucky Veterinary Medical Association (since 2005) and the Kentucky Cattleman Association (since 2009).
- Continued support for Dr. Laura Kennedy (PI) and Dr. Jennifer Janes (Co-PI) in the furtherance of the Kentucky Racehorse Breakdown Necropsy Program funded by the Kentucky Horse Racing Commission and the Equine Drug Research Council.
- Supported and guided Dr. Erdal Erol in the continued development of several problem-based diagnostic testing panels that assist veterinarians in obtaining the earliest definitive diagnosis on clinical cases.
- Continued support for Dr. Erdal Erol in his role as a member of the Joint National VS-AAVLD Antimicrobial Resistance Working Group.
- Continued support for Dr. Michelle Arnold in her role as a Co-PI on the Southeast Quality Milk Initiative to improve milk quality in the southeast.
- Continued support for Dr. Jennifer Janes in her role as PI on an internally funded project to identify genetic determinants in Wobbler Syndrome in horses.
- Continued support for Drs. Cindy Gaskill and Lori Smith in the modernization of instrumentation and staffing in the toxicology laboratory.
- Continued support for Dr. Cindy Gas-

kill in establishing a residency program in Veterinary Toxicology.
- Continued support for Dr. Alan Loynachan as a Co-PI on the development of a genetically defined live attenuated equine herpesvirus-1 vaccine for the horse.
- Continued support of Dr. Jackie Smith in the production and dissemination of the weekly reportable disease alerts distributed to the Office of the Kentucky State Veterianian.

Initiatives and Programs

- Planned evaluation of the Zoetis USDA licensed equine leptospirosis vaccine after three reproductive seasons of use (hoping to recruit a graduate student for the summer of 2018).
- Metagenomics Diagnostic Laboratory Section for UKVDL working closely with the Gluck Equine Research Center for a future hire of a bioinformatics faculty member (search underway) to assist in the formation of a metagenomics research effort within the Department of Veterinary Science.
- Implemented electronic reporting of EIA VS-10 results.
- Began training senior DVM students from the Lincoln Memorial University CVM in Harrogate, Tennessee, in four-week blocks. The LMU students spent roughly two weeks in pathology and two weeks in the ancillary diagnostic disciplines as part of a mandatory block. By the end of the calendar year, 51 students were trained at UKVDL. (Students on track to graduate with DVM degrees in May 2018.)

Issues and Challenges

- Personnel turnover. 4/68 (6%) turnover during calendar year 2017 down from 12 % in 2017.
- Generation of a new fee for service income. The UKVDL regulatory testing caseload continues to decline due to the increase in commercial laboratories and clinics that are running these tests and due to changing priorities by State Veterinarians requirements for testing based on disease risk (EIA, Piroplasmosis et al). The decrease in fiscal year 2017 caseload and income has led to a $200K deficit at the end of the fiscal year. Fortunately, UKVDL was able to cover the deficit with funds from the cooperative agreement with Lincoln Memorial University.
- Working closely with the UKVDL Advisory Committee, Dean Nancy Cox, Associate Dean Rick Bennett, and Chair David Horohov, the decision was made to increase fees for 78 selected texts to generate an approximate 15 percent overall increase in UKVDL fee income by approximately $233,000 for fiscal year 2018. An additional savings of roughly $20,000 would be realized by mothballing the alkaline digesters. Currently almost all tissue disposal is being met by rendering, a much cheaper option than alkaline digestion. Legislative and philanthropic initiatives will be pursued to generate further funds. Finally, efforts will continue to produce new revenue through engaging in research projects with biological companies. Fortunately, the cooperative agreement with LMU has peaked out at $500K per year, providing additional revenue which can be used for instrument purchases and beyond.

Director's Leadership Contributions (Select)

- President and executive director, American Veterinary Epidemiology Society, 5-year term, 2015-2020.
- Member, Advisory Board, Center for Animal Health in Appalachia, since 2015.
- Member, OIE-WHO-FAO-United Nations Global Alliance for Global Rabies Eradication, Expert Committee, since 2015.
- Executive director, World Association of Veterinary Laboratory Diagnosticians (WAVLD), since 2000. Coordinated planning for the meeting held in Sorrento, Italy, June 2017.
- Member, Kentucky Livestock Care and Standards Commission and Equine Health and Welfare Council (Governor appointment).
- Member, National One Health Initiative Advisory Board, since 2010.
- Member (ex officio), Kentucky Farm Bureau (six species committees), since 2014.
- Adjunct professor, Epidemiology, College of Public Health, University of Kentucky, since 2012.
- Adjunct professor, Epidemiology, College of Veterinary Medicine, Lincoln Memorial University, since 2014.
- Active member, eight standing committees of the AAVLD and other committees as listed on C.V.

Section Reports

Bacteriology/Mycology Section

Dr. Erdal Erol, Section Head, and Mr. Steve Locke, Section Supervisor

The bacteriology/mycology section of the UKVDL receives specimens to culture for the isolation and identification of potentially pathogenic bacteria and fungi from livestock and 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 leptospires and clostridia (blackleg). This section also 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.

In 2017, an additional technician was certified and trained for *Taylorella* (CEM) and National Poulty Improvement Plan (NPIP) culture. The bacteriology section is currently using the MALDI-TOF biotyper as a cutting-edge instrument for the quick identification of microorganisms. This equipment has already significantly decreased our turn-around time on the identification of many bacteria.

Highlights

- 9,205 aerobic cultures were performed on samples submitted to the UKVDL; significant bacterial pathogens such as *Nocardioform* bacteria, coliforms, beta-hemolytic streptococci, *Salmonella, Pasteurella, Mannheimia, Bibersteinia, Trueperella, Mycoplasma,* and *Staphylococci* were found in these samples.
- 7,108 CEM cultures were performed for the CEM regulatory screening program.
- 3,032 antimicrobial susceptibilities were performed to determine the antimicrobials that could be used for their treatment in exposed animals (MIC broth microdilution method).

- 1,379 specimens were tested for leptospires by fluorescent antibody testing.
- 728 specimens were cultured for NPIP salmonella testing. Our participation in NPIP helps poultry industry improve infectious disease control and eradication programs.
- 402 anaerobic cultures were performed. *Clostridium perfringens* and *C. difficile* screening was the predominant focus.
- 125 ruminant mastitis cultures were performed. Often collaborate with Extension veterinarian Dr. M. Arnold for communication of treatment options to client.
- 218 specimens were tested for fungal pathogens.
- 123 *Clostridium chauvoei* (blackleg) and *Clostridium septicum* fluorescent antibody tests were performed.

Major tests with total numbers are provided in Table 1.

Table 1. Bacteriology/Mycology Section.

Bacteriology Test	Method	Number
Clostridium chauvoei	FA	123
Clostridium novyi	FA	8
Clostridium septicum	FA	123
Clostridium sordellii	FA	7
Contagious Equine Metritis	Culture	5462
Contagious Equine Metritis	Culture	1646
Culture-Aerobic	Culture	9205
Culture-Anaerobic	Culture	402
Culture-Blood	Culture	0
Culture-Campylobacter	Culture	53
Culture-Dermatophilus congolensis	Culture	2
Culture-Fungal	Culture	193
Culture-Listeria	Culture	68
Culture-Microaerophilic	Culture	235
Culture-Mycobacterium sp.	Culture	2
Culture-Mycoplasma	Culture	147

Table 1. Bacteriology/Mycology, *continued*

Bacteriology Test	Method	Number
Culture-Ruminant Mastitis	Culture	125
Culture-Salmonella NPIP	Culture	728
Diagnostic Plan–Equine Diarrhea, Adult	Mixed	9
Diagnostic Plan–Equine Diarrhea/Septicemia, Foal	Mixed	5
Diagnostic Plan–Equine Respiratory	Mixed	6
Difficile Toxin A/B	ELISA	25
Leptospira	FA	1379
*MALDI Identification (isolates submitted)	MALDI-TOF	23
MIC Panel	Sensitivity	3032
Refer Isolate to Reference Lab	Other	14
Refer Isolate to Submitting Veterinarian	Other	26
Salmonella Typing	NVSL	80
Tritrichomonas, darkfield	Microscopic	32
Total		**23,160**

Table 2. Virology Section.

Virology Test	Method	Number
Bovine Corona Virus	FA	2
Bovine Respiratory Syncytial Virus	FA	6
Bovine Respiratory Syncytial Virus	VN	27
Bovine Rotavirus	FA	2
Bovine Viral Diarrhea	ELISA	7221
Bovine Viral Diarrhea	FA	359
Bovine Viral Diarrhea 1	VN	108
Bovine Viral Diarrhea 2	VN	107
Canine Adenovirus	FA	21
Canine Corona Virus	FA	11
Canine Distemper Virus	FA	96
Canine Herpesvirus	FA	39
Canine Parainfluenza 2	FA	20
Canine Parvovirus	FA	77
Equine Adenovirus	FA	4
Equine Herpesvirus 1	FA	853
Equine Herpesvirus 1	VN	71
Equine Influenza A1	HI	3
Equine Influenza A2	HI	3
Equine Protozoal Myeloencephalitis-Indirect Fluorescent Antibody Test	IFA	134
Equine Rotavirus	FA	12

continued

Table 2. Virology, *continued*

Virology Test	Method	Number
Equine Viral Arteritis	FA	7
Equine Viral Arteritis	VN	13202
Feline Herpesvirus	FA	35
Feline Infectious Peritonitis	FA	54
Feline Panleukopenia	FA	53
Infectious Bovine Rhinotracheitis	FA	136
Infectious Bovine Rhinotracheitis	VN	82
Parainfluenza-3 Virus	FA	6
Porcine Circovirus	FA	1
Porcine Parvovirus	FA	1
Porcine Reproductive & Respiratory Syndrome	FA	1
Porcine Rotavirus	FA	0
Potomac Horse Fever	IFA	182
Rotavirus	IA	0
Transmissible Gastroenteritis Virus	FA	0
Vesicular Stomatitis IN	VN	870
Vesicular Stomatitis NJ	VN	870
Virus Isolation	VI	724
West Nile IgM Capture	ELISA	128
Total		**25,528**

Virology Section

Dr. Erdal Erol, Section Head, and Ms. Sharon K. Ray, Section Supervisor

The virology section aids veterinarians and animal owners to diagnose viral infections and to treat and protect their animals. The section also works closely with UKVDL pathology section to test for evidence of viral infections in necropsy specimens. In addition, the virology section performs a high volume of regulatory tests for national sales and for both the national and international movement of animals and provides information to field veterinarians and animal owners regarding sample selection, preservation, shipping procedures, and interpretation of results.

Highlights

Virology conducted numerous virus neutralizations, virus isolations, ELISAs, and fluorescent antibody tests (FA) in support of animal agriculture not only in Kentucky but across the country and internationally. Virology added the EPMIFAT in January. Table 2 provides an overview of the variety and number of tests done this year.

Molecular Diagnostics Section

Dr. Erdal Erol, Section Head

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 also 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 consists 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 newcastle disease. The membership enables this unit to participate in national veterinary disease surveillance and to provide rapid coordinated diagnostic response in the event of future outbreaks within the veterinary industry.
- The section participated in a surveillance program of arboviruses (including Zika virus) in mosquito populations and avian influenza in poultry.
- Dr. Erol performed collaborative research with other scientists, particularly in the topics of infectious diseases.
- The major molecular tests (and their total numbers) performed by the molecular section is provided in the Table 3.

Table 3. Molecular Diagnostics Section.

Molecular Biology Test	Method	Number
2009 H1N1 Influenza RT-PCR	Real Time PCR	2
Amycolatopsis	PCR	246
Avian Influenza	Real Time PCR	824
Bluetongue	Real Time PCR	9
Bovine Coronavirus	Real Time PCR	131
Bovine Coronavirus	Real Time PCR	262
Bovine herpes virus 1	Real Time PCR	262
Bovine Respiratory Syncytial Virus	Real Time PCR	262
Bovine Rotavirus Group A	Real Time PCR	131
Bovine Viral Diarrhea	Real Time PCR	304
C. difficile Toxin A Gene	PCR	10
C. difficile Toxin B Gene	PCR	10
Canine Influenza	Real Time PCR	31
Chlamydiales	PCR	32
Clostridium perfringens Toxin Typing	PCR	79
Clostridium piliforme	PCR	6
Crossiella equi	PCR	246
Cryptosporidium	Real Time PCR	131
E. coli K99+	Real Time PCR	131
Eastern Equine Encephalitis	Real Time PCR	6
Epizootic Hemorrhagic Disease	Real Time PCR	14
Equine Adenovirus	PCR	1
Equine Arteritis Virus	Real Time PCR	12
Equine Coronavirus	Real Time PCR	1
Equine Herpesvirus 1	Real Time PCR	1010
Equine Herpesvirus 1 type	Real Time PCR	43
Equine Herpesvirus 2	PCR	131
Equine Herpesvirus 3	PCR	13
Equine Herpesvirus 4	Real Time PCR	106
Equine Herpesvirus 5	PCR	103
Equine Influenza	Real Time PCR	340
Equine Protozoal Myeloencephalitis	Real Time PCR	22
Equine rota virus	Real Time PCR	1
Histophilus somni	Real Time PCR	162
ILT	Real Time PCR	8
Lawsonia intracellularis	PCR	134
Lawsonia intracellularis	Real Time PCR	4
Leptospira	Real Time PCR	168
Mannheimia haemolytica	Real Time PCR	162
Moraxella bovis	PCR	0
Mycobacterium paratuberculosis	Real Time PCR	88
Mycoplasma bovis	PCR	3
Mycoplasma bovis	Real Time PCR	162
Mycoplasma gallisepticum	Real Time PCR	24
Mycoplasma species	PCR	3
Mycoplasma synoviae	PCR	24
Newcastle Disease Virus	Real Time PCR	4
Newcastle Disease Virus	Real Time PCR	1
Ovine Herpesvirus 2	PCR	3
Pasteurella multocida	Real Time PCR	162
Potomac Horse Fever	Real Time PCR	437
Research/Other	Unknown	0
Rhodococcus equi	Real Time PCR	23
Rhodococcus equi virulence gene vapA	Real Time PCR	19
Salmonella	Real Time PCR	965
Sequence Analysis	PCR	0
St. Louis Virus	Real Time PCR	17
Streptococcus equi	PCR	708
Tritrichomonas foetus	Real Time PCR	206
West Nile Virus	Real Time PCR	28
Zika Virus	Real Time PCR	35
Total		**8,462**

continued

Table 3. Molecular Diagnostics, *continued*

Pathology Section

Dr. David Bolin, Section Head

The UKVDL pathology section is composed of ten faculty pathologists (eight UKVDL service pathologists and two Lincoln Memorial University teaching pathologists), 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 biopsy specimens and cytological examinations on body fluids, and fine needle tissue aspirates submitted by veterinarians, producers, and pet owners. The pathologists are fully supported by other laboratory sections in 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 observed at necropsy are correlated with other laboratory tests, including microscopic examination of tissues, and a comprehensive report is prepared for each pathology case.

Teaching has been an additional responsibility of pathologists at UKVDL. One pathologist, in cooperation with Lincoln Memorial University (LMU), is responsible for the development, implementation, and administration of a curriculum in diagnostic pathology and supporting disciplines for fourth-year students from LMU College of Veterinary Medicine. The first rotation of students began July 2017. Furthermore, short reviews (1-2 weeks) in diagnostic pathology are offered to veterinary surgical and internal medicine residents to fulfill the pathology requirement for the American College of Veterinary Surgeons and American College of Veterinary Internal Medicine.

Research activities of VDL pathologists, in collaboration with scientists at the Gluck Equine Research Center and other university departments, are varied and involve a wide variety of equine diseases. These include:

- Pathology and immune function in aged PPID horses
- Retrospective analysis of diseases in aged horses
- Identifying genetic determinants in wobbler syndrome

Table 4. Necropsies.

Species	Number
Avian	105
Bovine	1,051
Caprine	104
Equine	1,532
Ovine	82
Porcine	27
Small animal	386
Miscellaneous	61
Total	**3,348**

- Determining minimum toxic dosage of diphacinone in horses
- Proximal sesamoid pathology in thoroughbred catastrophic breakdown injuries
- Maturation of the articular growth complex in the medical femoral condyle of young thoroughbreds
- Magnetic resonance imaging of subclinical osteochondrosis in horses
- Kentucky horse racing necropsy program
- In vivo evaluation of the safety and efficacy of extracorporal oxygenation in sheep
- Case-based distance learning for food animal veterinarians
- Evaluation of lung inflammation in horses with severe acute gastrointestinal disease

Highlights

Necropsy Examinations. Postmortem examinations (necropsies) are conducted on whole animals, specimens from field necropsies, and equine placentas submitted to the VDL with the purpose of identifying any pathologic changes that would indicate an inflammatory or neoplastic disease process, physical injury, poisoning, or any other process that results in illness. Table 4 lists necropsies by species and number

Biopsies. Tissue lesions are removed surgically or portions biopsied from live animals and sent to the laboratory for determination of the type of disease process, recommendations for additional surgical treatment if necessary, and prognosis. These tissue specimens are processed, and microscopic slides are prepared for the pathologists to examine by microscopy. Tissue specimens representing 2,917 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.

Table 5. Pathology Section.

Pathology Tests & Procedures	Number
Biopsy	3023
BSE Surveillance	61
Chronic Wasting Disease	120
Chronic Wasting Disease	0
Cytology	291
Cytology on Submitted Slides	181
Field Necropsy	0
Field Necropsy–Equine Adult	3
Field Necropsy–Equine Fetus/Foal	5
Field Necropsy–Food Animal < 1 Year	48
Field Necropsy–Food Animal Adult	19
Field Necropsy–Fresh–Equine Adult	3
Field Necropsy–Fresh–Equine Fetus/Foal	5
Field Necropsy–Fresh–Food Animal	19
Field Necropsy–Poultry/Food Birds	2

Table 5. Pathology, *continued*

Pathology Tests & Procedures	Number
Field necropsy–Small Animal/Exotic/Petbird/Wildlife	40
Gross Necropsy–Equine Adult	455
Gross Necropsy–Equine Fetus/Foal	779
Gross Necropsy–Equine Placenta	285
Gross Necropsy–Food Animal Adult	343
Gross Necropsy–Food Animal Fetus/Neonate	680
Gross Necropsy–Legal Case	3
Gross Necropsy–Poultry (up to 3 birds)	95
Gross Necropsy–Small Animal/Exotic Animal	418
Rabies	210
Research/Other	0
Scrapie Surveillance	1
Tests Performed for Field Necropsy	0
Total	**7,089**

Cytologies. Preparations of cells harvested and/or aspirated from abnormal lesions or body fluids are placed on microscopic slides and stained for examination under the microscope by the pathologists. Cytological examinations were performed, diagnoses made, and reports generated for 391 cases.

Table 5 details the tests and procedures performed by the pathology section.

Clinical Pathology Section

Bonnie L. Decker, Section Head

The clinical pathology section provides chemistry, hematology, endocrine, urinalysis, fluid analysis, fecal parasite exams, and other testing to animal owners, veterinarians, and the agriculture community. The section also provides support, cytology prep, and testing to UKVDL's pathologists and testing related to necropsy.

The clinical pathology lab is available to University of Kentucky equine and animal science researchers who submit specimens for monitoring various chemistry, hematology, and endocrine levels in their research animals. Results are available the same day as receipt of sample, 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.

Section personnel remained stable with a combined 60+ years of experience. The clinical pathology lab is dedicated to meeting the current and future needs of the agriculture community, companion animal community, veterinarians, and pathologists. Table 6 details the tests performed by the section.

Table 6. Clinical Pathology Section.

Clinical Pathology Test	Number
A/G Ratio	678
ACTH, Endogenous	24
Albumin	678
Albumin–Electrophoresis	0
Alkaline Phosphatase	678
Alpha 1–Electrophoresis	0
Alpha 2–Electrophoresis	0
Amylase	164
Anisocytosis	550
Band Neutrophils	550
Basophils	550
Beta–Electrophoresis	0
BUN	726
BUN–Eye Fluid	145
BUN/Creatinine Ratio	678

continued

Table 6. Clinical Pathology, *continued*

Clinical Pathology Test	Number
Calcium	683
Calcium–Eye Fluid	145
Chloride	676
Chloride–Eye Fluid	145
Cholesterol	278
Chyle Test	0
Color	155
Cortisol, 4 Hr Post Dex	33
Cortisol, 8 Hr Post Dex	33
Cortisol, Baseline	20
Cortisol, Post ACTH	119
Cortisol, Pre ACTH	119
Cortisol, Pre Dex	28
Creatine Kinase	513
Foal IgG	0

continued

Table 6. Clinical Pathology, *continued*

Clinical Pathology Test	Number
Gamma–Electrophoresis	0
Gamma GT	513
Giardia Antigen	12
Globulin	678
Glucose	677
HGB	1036
Hypochromasia	550
Lymphocytes	550
Macrocytosis	550
Magnesium	402
Magnesium–Eye Fluid	146
MCH	1036
Creatinine	679
Creatinine–Eye Fluid	145
Cryptosporidia	27
Eosinophils	550
Fecal Examination	846
Feline Pancreatic Lipase	0
Fibrinogen	49
MCHC	1036
MCV	1036
Microcytosis	550
Monocytes	550
Nucleated RBC	550
Parasite Identification	9

continued

Table 6. Clinical Pathology, *continued*

Clinical Pathology Test	Number
PCV/HCT	1036
pH–Fluid	66
Phenobarbital	118
Phosphorus	678
Phosphorus–Eye Fluid	145
Poikilocytosis	550
Polychromasia	550
Potassium	678
Potassium–Eye Fluid	145
Progesterone	252
RBC	1036
RBC–Fluid	62
Reticulocyte Count	1
Segmented Neutrophils	550
SGOT/AST	515
SGPT/ALT	165
Slide Preparation	78
Sodium	678
Sodium–Eye Fluid	145
Specific Gravity	66
Stone Analysis	241
T3	46
T4	112
Target Cells	550
Total Bilirubin	678

continued

Table 6. Clinical Pathology, *continued*

Clinical Pathology Test	Number
Total Protein	678
Total Protein–Electrophoresis	0
Total Protein–Fluid	62
Transparency	155
Trypsinogen/TLI	10
TSH	16
Urinalysis–Amorphous	89
Urinalysis–Bacteria	89
Urinalysis–Bilirubin	89
Urinalysis–Blood	89
Urinalysis–Casts	89
Urinalysis–Crystals	89
Urinalysis–Epithelial	89
Urinalysis–Glucose	89
Urinalysis–Ketone	89
Urinalysis–pH	89
Urinalysis–Protein	89
Urinalysis–RBC	89
Urinalysis–Specific Gravity	89
Urinalysis–Urobilinogen	89
Urinalysis–WBC	89
WBC	1036
WBC–Fluid	62
Total	**33,040**

Quality Control/Quality Assurance Section

Mary Harbour, Section Head

The goal of the University of Kentucky Quality Management System (QMS) is to ensure quality of all test results and continuous improvement of all services to clients. The design and goal of the QMS and Quality Assurance program is based on American Association of Veterinary Diagnostic Laboratory (AAVLD) requirements, International Standards Organization (ISO) guidelines (ISO 17025), and Organization of International Epizootics (OIE). The UKVDL QMS helps fulfill the university's mission of improving service delivery while achieving excellent human relations (internally and externally), sound leadership, and effective communications.

The quality assurance section now consists of two employees: a quality assurance manager and a full time quality assistant. The requirements for maintaining the QMS are continuously being updated. The assistant position was created to meet the increasingly more stringent AAVLD requirements, and OIE, NAHLN, and federal mandates.

Since 2010 UKVDL has been a part of the National Animal Health Laboratory Network (NAHLN). QA maintains and manages 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 portal also contains NAHLN policies and procedures as well as NVSL, USDA, and NAHLN proficiency testing results and reports. The section continues to prepare quarterly reports to the NAHLN. The QA manager serves on the NAHLN Methods Technical Working Group Committee.

UKVDL QA section monitors and audits the various sections in the lab. QA assists the sections not just to prepare for the various inspections or accreditation site visits but also to assist them in improving processes, procedures, and polices.

To maintain conformance to all requirements, the QA manager attended Quality Assurance Committee Meeting at the annual AAVLD meeting and also attended AAVLD auditor training. The QA manger assisted other AAVLD auditors on an audit of another AAVLD laboratory in another state.

In 2014, the Quality Assurance Section implemented new Quality system software. This software has improved document control, streamlined internal audits, improved equipment inventory, improved Competency and Training Assessments and improved Corrective Action investigations. The software has replaced most paper documentation and provided more electronic documentation of the Quality System. Quality Assurance will continue to monitor and update policies and procedures to meet the AAVLD requirements.

Ruminant Extension Section

Dr. L. Michelle Arnold, Ruminant Veterinarian

The ruminant Extension veterinarian works closely with the College of Agriculture, Food and Environment (CAFE) faculty, UKVDL faculty and clients, county Extension agents, producer organizations, state livestock commodity specialists, and state and federal regulatory agencies regarding all veterinary ruminant health issues. Perhaps most important is outreach to food animal veterinarians through regular continuing education programs, newsletters, and animal health bulletins. In addition, by developing this close working relationship between practicing veterinarians and UKVDL faculty, better diagnostic workups on challenging diagnostic cases and complex investiga-

tions result in more definitive answers for the producers of Kentucky. An exciting addition is the funding from USDA to develop case-based video modules for food animal practitioners, especially those in underserved rural areas who may find it difficult to attend traditional continuing education meetings.

The entire network of industry stakeholders must be involved to lower morbidity and mortality rates, attain better rates of production, and add more pounds sold to return greater profits throughout the agricultural community. By focusing on improvements in ruminant health, the goal is to improve our national reputation for producing quality commodities in Kentucky. Dr. Arnold continues to be involved in collaborative research projects within the University with the dairy, beef, and small ruminant industries, especially those involving diagnostic veterinary medicine, to reach this goal.

The livestock diseases diagnosed at the UKVDL, along with recommendations for their treatment, prevention, and control, form the core of the information sent out from this position. New University research, governmental directives, and other stakeholder concerns are also communicated broadly for discussion and adoption to benefit producers throughout Kentucky.

Highlights

- Secured a nationally competitive, three-year extramural grant entitled Case-based Distance Learning for Food Animal Veterinarians for $250,000. This grant was awarded to Drs. Arnold, Janes, and Gaskill from the United States Department of Agriculture, National Institute of Food and Agriculture, Veterinary Services Grant Program. Program Code VSGPE. Award number 2017-70024-27326.
- For the second consecutive year, coordinated the selection and presentation of continuing education awards to Southeastern Dairy veterinarians (nominated by producers and Extension personnel) to help them gain more experience in understanding milk quality, and in turn helping them bring value to their producer-clients for years to come. One dairy practitioner from each participating state (TN, KY, VA, MS, GA, FL) was selected to receive full tuition for the AABP preconference Quality Milk Production seminar held September 11 and 12 in Omaha as well as two nights lodging at the conference hotel. One participant was affiliated with a veterinary school and will take this information back to the students to begin training the next generation of professionals.
- Organized and hosted two well-attended food animal veterinary continuing education meetings at the diagnostic laboratory (UKVDL). A total of 15 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 Elanco Animal Health. Sixty practicing food animal veterinarians and 24 other veterinarians or health professionals attended the winter meeting. A summer meeting was held in August at the UKVDL sponsored by Zoetis Animal Health. Fifty-five practicing veterinarians and 15 others were in attendance. Dr. Arnold lectured in the summer meeting on current topics of interest including Epizootic Hemorrhagic Disease and abortion diagnostics. These meetings are also used for state and federal updates so Kentucky practitioners can stay abreast of current regulatory situations.
- Served on the equine Extension faculty search committee chaired by Dr. Martin Nielsen and the UKVDL Pathologist Search Committee chaired by Dr. Alan Loynachan. (These committees will be instrumental in the selection of two new faculty members in early 2018.)
- Continued to deliver multiple lectures regarding animal health in 400 level undergraduate classes in beef and dairy science and a veterinary lab to the dairy class. She also lectured in a new 300 level undergraduate class entitled Dairy Cattle Diseases and Health.
- Attended the two-day AABP pre-conference milk quality seminar in Omaha, Nebraska. Gained valuable knowledge in current mastitis prevention and control and became acquainted with the new robot milking technology. Dr. Arnold intends to incorporate this information in future CE meetings.
- Continued to serve on the BVD Task Force at the request of the Kentucky state veterinarian (Dr. Stout) to discuss BVD PI testing and the enforcement of new laws regarding the movement of positive calves as well as brainstorm long term solutions. In 2017, the Kentucky and Tennessee state veterinarians made this a joint effort between the two states.
- Participated in 30 meetings in 2017, including field days, producer meetings, farm visits, and the comprehensive Master Cattlemen course throughout the state to educate producers in best management practices, identify existing problems, and promote prevention through realistic on-farm changes.
- Wrote a monthly health article for Cow Country News, the newsletter of the Kentucky Cattlemen's Association with a 2017 statewide circulation of 10,200. In addition, regularly contributed to the KVMA newsletter, Off the Hoof (UK Beef electronic newsletter), and Kentucky Dairy Notes (UK Dairy electronic newsletter), as well as several national magazines, including *Feed Lot* magazine.
- Educated producers, Extension personnel, and veterinarians about the new Veterinary Feed Directive through many regional meetings and articles throughout the year. This new government strategy began in January 2017 and affects the way antibiotics administered through the feed or water are sold to the public.
- Continued to serve as a consulting veterinarian for the UK Swine Unit and Sheep Unit on several research projects. Received certification to complete mobile certificates of veterinary inspection (mCVIs), which have been used for the UK Swine unit.
- Serves as an associate member of the Graduate Faculty. Served on the graduate committee for Ph.D. candidate Ms. Barbara Wadsworth-Jones, who has now successfully completed the program, one Ph.D. committee (Ms. Betty Kawonga), and two graduate committees for M.S. degrees in Animal Science (Mr. Gustavo Mazon and Ms. Lori Grinter). Also served as a judge for the Animal and Food Sciences Graduate Association Annual Poster Symposium and participated as a reviewer for the Dairy Research Showcase.

- Continues to revise and expand the database of food animal veterinarians with email addresses and cell phone numbers to enhance the speed of communication and decrease postal expenses. The list currently has approximately 400 veterinarians and 288 veterinary clinics.
- Participated in the annual producer meeting, bi-monthly conference calls, and program development with faculty from six Southeastern land grant institutions funded by the Southeast Quality Milk Initiative (SQMI) grant. This is a multi-state grant for $3M over a five-year funding period that began in February 2013. Dr. Arnold moderated the SQMI morning educational session and compiled results for Objective 4 to the stakeholders at the 2017 Annual Meeting held in Nashville, TN. Dr. Arnold coordinates the printing and distribution by the University of Kentucky of the SQMI Quarterly Newsletter 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 interpretation and communication of results to veterinarians and producers. Was actively engaged in 215 cases and was an associated veterinarian in 101 food animal cases. While at the lab, Dr. Arnold answers a plethora of questions from veterinarians, producers, and Extension agents on a variety of ruminant health topics.
- Served on the Farm Bureau Advisory Board for Beef, Dairy, and Small Ruminants (sheep and goats) in 2017. Represented the University of Kentucky at the National Cattlemen's Beef Association (NCBA) Convention in Nashville during several health-related meetings.

Kentucky veterinarians, Extension agents, producers, government entities, and the university benefit from a strong livestock sector, and health is a major component. 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 Section

Meg Steinman, Section Head

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. Many tests can be done on multiple species, and some are species specific. Please contact the lab if you have any questions. This section offers a wide variety of testing by various types of methodologies. Table 7 details serology tests and methods.

Highlights

- **Poultry**. This section participates in USDA audits performed by NPIP officials to maintain status as an NPIP approved laboratory. Personnel from this section have attended National Poultry Improvement Plan (NPIP) approved training courses. We successfully passed the avian influenza proficiency test and mycoplasma test for 2017.
- **Equine.** This section successfully passed USDA-APHIS audits and proficiency tests to continue to offer equine infectious anemia (EIA) antibody testing, CEM-CF testing and piroplasmosis testing.
- **Bovine and ruminants.** The serology section offers a variety of antibody tests performed on serum from bovines and other ruminant species.
- **Canine and feline.** This section offers a variety of tests that can be run on dogs and cats, including the tick panel for canines. This panel includes detection for antibody to ehrlichia, borrelia burgdorferi (Lyme disease), anaplasma, and rickettsia rickettsia (Rocky Mountain spotted fever).
- **Porcine.** This section offers regulatory testing for swine, including brucellosis antibody and pseudorabies (PRVgB).

Additional Activities

- The section head serves on the 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 the food animal. In spring 2017 the section head coordinated UKVDK participation in a mock FAD drill, testing response to an outbreak of avian influenza. Findings from the exercises will help determine the strengths

Table 7. Seriology Section.

Serology Test	Method	Number
Anaplasma phagocytophilum	ELISA	30
Anaplasmosis	CELISA	1072
Avian Influenza	AGID	2
Avian Influenza	ELISA	19277
Babesia caballi (equine piroplasmosis)	CELISA	1186
Blastomycosis	AGID	102
Bluetongue	CELISA	174
Bovine Leukemia Virus	ELISA	842
Bovine Pregnancy Test	ELISA	1864
Brucella ovis	ELISA	4
Brucellosis AB	BAPA	1165
Brucellosis abortus	CARD	187
Brucellosis CF	CF	10
Brucellosis Equine	AG	2
Brucellosis Melitensis	CARD	187
Brucellosis Melitensis	AG	15
Brucellosis Standard	AG	1
Canine Brucellosis	AG	143
Canine Pregnancy	ELISA	0
Caprine Arthritis/Encephalitis	CELISA	159
Caseous Lymphadenitis	Unknown	60
Contagious Equine Metritis	CF	1017
Contagious Equine Metritis	CF	92
Epizootic Hemorrhagic Disease	AGID	141
Equine Infectious Anemia	AGID	356
Equine Infectious Anemia	ELISA	12114
Equine Infectious Anemia (Stockyard)	ELISA	2384
Ehrlichia	ELISA	29
Feline Immunodeficiency Virus	ELISA	27
Feline Infectious Peritonitis Antibody	ELISA	15
Feline Leukemia Virus Antigen	ELISA	24
Heartworm Antigen	ELISA	16
Histoplasmosis	AGID	80
Hold Specimen	Unknown	2
Infectious Bronchitis Virus antibody	ELISA	20
Infectious Bursal Disease antibody	ELISA	829
Johne's Antibody	ELISA	1592
Leptospirosis–Bratislava	MAT	38
Leptospirosis–Canicola	MAT	227
Leptospirosis–Grippotyphosa	MAT	3489
Leptospirosis–Hardjo	MAT	422
Leptospirosis–Icterohaemorrhagia	MAT	226
Leptospirosis–Pomona	MAT	3685
Lyme Disease Antibody (Borrelia burgdorferi)	ELISA	42

continued

Table 7. Seriology, *continued*

Serology Test	Method	Number
Mycoplasma gallisepticum	ELISA	39217
Mycoplasma synoviae	ELISA	39217
Neospora Caninum	CELISA	274
Newcastle Disease Virus Antibody	ELISA	10
Ovine Progressive Pneumonia	CELISA	22
Pseudorabies gB	ELISA	98
Regulatory Plan–EIA & EVA	NULL	448
Research/Other	Unknown	3
Rocky Mountain Spotted Fever (Rickettsia rickettsii)	IFA	34
Salmonella Pullorum	MAGG	29
Salmonella pullorum-Typhoid	AG	20709
Theileria (Babesia) equi (equine piroplasmosis)	CELISA	2619
Toxoplasmosis	ELISA	74
Toxoplasmosis	Latex agglutination	0
Total		**15,6103**

and weaknesses of the individual laboratory and identify what needs to be in place to help respond.

- The section head is a member of the Poultry Health Advisory Board for Kentucky.
- The serology section participates in research projects investigating the levels of MAT leptospiral titers in serum and vitreous fluid.

Toxicology Section

Dr. Cynthia L. Gaskill, Section Head

The primary mission of the UKVDL toxicology section is to provide toxicological diagnostic testing capabilities and consultations to Kentucky veterinarians, UKVDL pathologists, county Extension agents, livestock producers, pet owners, state officials, and others. A large variety of toxicological tests are available, including analyses for metals and minerals; organic compounds including a multitude of pesticides, drugs, and other chemicals; biological toxicants such as plant, insect, bacterial, and fungal toxins; and numerous other toxicants. Tests are performed in tissues, gastrointestinal contents, biological fluids, baits, feeds, 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. Alerts, updates and toxicological information regarding cases of poisoning or contaminated animal feeds are also provided to the state veterinarian's office.

The toxicology section personnel consist of Cynthia Gaskill, clinical veterinary toxicologist and section head; Lori Smith, senior analytical chemist; Michelle Helm, technician; Kyle Francis, research analyst; Joseph Johnson, research analyst; Megan Romano, toxicology resident; and student interns.

Highlights

The most common causes of poisoning diagnosed at the UKVDL in 2017 included:

- **Cattle, sheep, goats**. Yew (Taxus), nitrate, sodium, lead, copper, arsenic, selenium, buckeye (Aesculus spp.), urea/ammonia, ionophores
- **Horses.** Botulism
- **Dogs and cats.** Anticoagulant rodenticides; organochlorine, carbamate and organophosphate pesticides; illicit drugs; ethylene glycol; tremorgenic mycotoxins (Penitrem A and Roquefortine); and toxic mushrooms
- Received funding from several federal agencies and other grants, totaling approximately $150,000 for this calendar year. This funding provides support for instrumentation, personnel, and supplies to develop analytical methods and complete inter-laboratory validations studies, to investigate poison cases involving drugs and feeds, and advance understanding of a number of important toxicants. Our FDA grants involve collaboration with several veterinary diagnostic laboratories including the Davis California Animal Health and Food Safety Laboratory, Iowa State University Veterinary Diagnostic Laboratory, the Washington Animal Disease Diagnostic Laboratory, the University of Guelph Animal Health Laboratory ,and others
- Continued providing serum and plasma cobalt analyses for several horse racing jurisdictions. Performed over 4,600 cobalt analyses
- Hosted student interns from the University of Kentucky Agricultural and Medical Biotechnology program
- Continued providing forage ergovaline analyses for the University of Kentucky pasture evaluation program and for producers, Extension agents, researchers, and others across the country
- Participated in numerous proficiency programs to ensure quality results and revised and reviewed toxicology standard operating procedures
- Our first toxicology resident, Dr, Megan Romano, continued her second year of the program. The UKVDL veterinary toxicology residency program is one of only three such programs in the U.S.
- Drs. Gaskill and Romano provided half of the lectures for the second-year veterinary toxicology course at the Lincoln Memorial University College of Veterinary Medicine (LMU), and provided toxicology case rounds discussions for the diagnostic medicine rotations for the fourth-year LMU veterinary students as part of the cooperative agreement between LMU and the University of Kentucky

The UKVDL toxicology section participated in several research projects directly applicable to improvements in diagnostic offerings. Funding from these projects helped support instrumentation and personnel also used for diagnostic purposes. Projects included:

- Evaluation of Kentucky barn owls for evidence of chemical contaminations.
- Inter-laboratory method validation study for carbamates in rumen contents (collaboration with the California Animal Health and Food Safety laboratory)
- Quantitation of metals in pet jerky treats, tissues, and blood (collaboration with Washington Animal Disease Diagnostic Laboratory and University of Idaho Analytical Sciences laboratory)
- Development and validation of a method to quantitate anticoagulant rodenticides in serum
- Continuation of a study to determine the minimum toxic dosage of the anticoagulant rodenticide diphacinone in horses

The most commonly performed toxicology diagnostic tests are summarized in Table 8. Research testing is not included.

Table 8. Toxicology Section.

Toxicology Test	Number
3,5-dimethoxyphenol	4
Aconitine	4
Aflatoxin	6
Ammonia	0
Anabasin	4
Arsenic–Blood, Whole	28
Arsenic–Feed	5
Arsenic–Kidney	21
Arsenic–Liver	42
Arsenic–Other	82
Arsenic–Serum	9
Arsenic–Water	5
Atropine	4
Blue Green Algae ID	0
Bone Marrow Fat	1
Boron–Feed	0
Boron–Kidney	0
Boron–Liver	0
Boron–Other	0
Brodifacoum	52
Bromadiolone	52
Bromethalin	1
Bromide–Serum	17
Bromide–Water	5
Cadmium–Blood	1
Cadmium–Feed	5
Cadmium–Kidney	21
Cadmium–Liver	37
Cadmium–Other	5
Cadmium–Water	5
Calcium–Feed	0
Calcium–Kidney	0
Calcium–Liver	0
Calcium–Other	0
Chloride	52
Chloride in Water	7
Chlorphacinone	52
Cholinesterase activity	0
Chromium–Blood	1
Chromium–Feed	5
Chromium–Kidney	21
Chromium–Liver	37
Chromium–Other	5
Chromium–Serum	0
Chromium–Water	5
Clostridium botulinum	4
Cobalt–Blood	1
Cobalt–Feed	5

continued

Table 8. Toxicology, *continued*

Toxicology Test	Number
Cobalt–Kidney	21
Cobalt–Liver	668
Cobalt–Other	7
Cobalt–Serum	4624
Cobalt–Water	5
Coniine	4
Copper–Feed	5
Copper–Kidney	22
Copper–Liver	667
Copper–Other	5
Copper–Serum	118
Copper–Water	5
Coumachlor	53
Coumafuryl	0
Coumatetralyl	0
Cyanide	0
Deltaline	4
Determine Required Testing	23
Dicoumarol	52
Difenacoum	0
Difethialone	52
Diphacinone	52
Ergocornine	0
Ergocristine	0
Ergocrytpine	0
Ergonovine	0
Ergosine	0
Ergotamine	0
Ergovaline	299
Ethylene Glycol	7
Examine Contents	23
Feed Analysis, Basic	0
Feed Microscopy	0
Fluoride–Water	5
Fumonisin	6
Gamma-coniceine	4
GC/MS Organic Compound Screen	25
Glycolic Acid	7
Iron–Feed	5
Iron–Kidney	21
Iron–Liver	667
Iron–Other	5
Iron–Serum	115
Iron–Water	5
Ivermectin	0

continued

Table 8. Toxicology, *continued*

Toxicology Test	Number
Lasalocid	8
Lead–Blood, Whole	31
Lead–Feed	5
Lead–Kidney	21
Lead–Liver	45
Lead–Other	24
Lead–Water	8
Lysergic acid	0
Lysergol	0
Magnesium–Feed	5
Magnesium–Kidney	21
Magnesium–Liver	37
Magnesium–Other	5
Magnesium–Water	5
Manganese–Blood	1
Manganese–Feed	5
Manganese–Kidney	21
Manganese–Liver	667
Manganese–Other	5
Manganese–Serum	115
Manganese–Water	5
Mercury–Blood, Whole	0
Mercury–Feed	0
Mercury–Kidney	0
Mercury–Liver	0
Mercury–Other	0
Molybdenum–Feed	5
Molybdenum–Kidney	21
Molybdenum–Liver	667
Molybdenum–Other	5
Molybdenum–Serum	115
Molybdenum–Water	5
Monensin	15
Narasin	8
Nicotine	4
Nitrate–Forage	21
Nitrate–Ocular Fluid	152
Nitrate–Other	2
Nitrate–Serum	1
Nitrate–Water	5
Nitrite–Forage	21
Nitrite–Ocular Fluid	152
Nitrite–Other	2
Nitrite–Serum	1
Nitrite–Water	5
Ochratoxin	6
Other Test	4

continued

Table 8. Toxicology, *continued*

Toxicology Test	Number
Paraquat	0
Penitrem A	3
Percentage Moisture	23
pH	41
pH in Water	0
pH-old	41
Phosphate–Water	678
Phosphate–Water	5
Phosphorus–Feed	5
Plant ID	6
Potassium–Feed	5
Potassium–Other	5
Potassium–Water	5
Research/Other	2
Roquefortine	3
Salinomycin	8
Scopolamine	4
Selenium–Blood	56
Selenium–Feed	5
Selenium–Kidney	21
Selenium–Liver	668
Selenium–Other	5
Selenium–Serum	143
Selenium–Water	5
Sodium–Brain	10
Sodium–Feed	5
Sodium–Other	5
Sodium–Water	5
Strychnine	0
Sulfate–Water	5
Sulfur–Feed	2
T-2 mycotoxin	6
Taxine–Yew	4
Urea/NPN	0
Vitamin E–Serum or Tissue	0
Vomitoxin	7
Warfarin	52
Zearalenol	6
Zearalenone	6
Zinc–Blood	0
Zinc–Feed	5
Zinc–Kidney	21
Zinc–Liver	667
Zinc–Other	5
Zinc–Serum	116
Zinc–Water	5
Total	**12,281**

Epidemiology Section

Dr. Jacqueline L. Smith, Section Head

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

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

The section is now producing live disease and diagnostic interactive maps utilizing data streams generated in the lab's pathology and diagnostic testing sections. These maps are available to the public for all species we see at the lab, available on the lab's website. The maps are interactive, giving data on demand at the click of a button. The maps show real-time disease information diagnosed for the state of Kentucky. The UKVDL is the first veterinary diagnostic lab in the United States to have this capacity freely available to the public.

Highlights

- 221 telephone consults for suggestions, recommendations, and information related to animal health issues
- 179 statistics requests from UKVDL and UK faculty, state and federal officials, local veterinarians, and LMU-CVM faculty, up to 15 hours each
- 368 graphics requests from UKVDL faculty, state and federal officials, 2–10 hours each
- 52 reportable disease reports to the state veterinarian, 1 hour each week
- 2 custom interactive maps for USDA-APHIS, 18 hours
- 1 custom interactive map for Kentucky Fish and Wildlife, approximately 9 hours
- 168 social media posts for UKVDL official Facebook and Twitter accounts

Invited Talks/Presentations

- Kentucky Equine Forum, Lexington. January
- AAVLD. San Diego, CA. October.
- Lexington Kennel Club, Lexington. November
- Potomac Regional Veterinary Conference, Williamsburg, VA. November.
- Kentucky Farm Bureau, Louisville. December

Agricultural Economics

The mission statement of the Department of Agricultural Economics is to develop and apply knowledge to aid rural and agricultural decision-makers in addressing economic issues through integrated research and educational programs that enhance incomes and quality of life in Kentucky and beyond. Toward that end, the department conducts research in production economics, farm management, agricultural marketing, agribusiness management, international trade, agricultural policy, community and rural economic development, international development, equine economics, and environmental and resource economics.

The department currently consists of 21 faculty, 14 professional staff, 13 support staff, and 42 graduate students. The professional staff includes 10 Kentucky Farm Business Analysis (KFBM) specialists. In addition, the department houses the Community Economic Development Initiative of Kentucky (CEDIK), the Kentucky Small Business Development Center (SBDC), the college Office of Diversity, and the college Office of International Programs. Departmental faculty also contribute to numerous college- and university-wide initiatives including the Center for Crop Diversification, UKAg Equine Programs, the Natural Resources and Environmental Sciences Program, the Sustainable Ag Program, and the Grain and Forage Center of Excellence.

The department administers both M.S. and Ph.D. programs in agricultural economics. Graduate students make important contributions to departmental research efforts and frequently present their findings at regional and national professional meetings. Graduate students also publish regularly in scholarly journals.

Animal and Food Sciences

The Department of Animal and Food Sciences (AFS) is involved in all three mission areas of the college (research, teaching, and outreach), and currently includes 37 full-time faculty, 14 adjunct faculty, 60 staff employees, 40 graduate students, and 7 postdoctoral scholars. Our current distribution of faculty effort is approximately 34 percent research, 28 percent teaching, 31 percent Extension, and 7 percent special assignment. Over the past three years the department has averaged approximately $3.94 million per year in direct extramural funding and approximately $5.16 million per year in collaborative extramural funding. The department provides instruction for two undergraduate degree programs, Animal Sciences (approximately 361 students) and Food Sciences (approximately 35 students). Animal Sciences majors can choose one of three options: Animal Industry, Food Industry, and Pre-Professional. The Food Sciences degree program meets the requirements for accreditation by the Institute of Food Technologists and the National Organization of Food Science Professionals. In addition, the department is heavily involved in instruction for the multidisciplinary Equine Science and Management undergraduate degree program (approximately 304 students).

Research and Laboratory Facilities

The department has laboratory and animal space in W.P. Garrigus Building; state-of-the-art beef cattle, sheep, and swine facilities at C. Oran Little Research Center; dairy and poultry facilities at Coldstream Farm; equine facilities at Maine Chance Farm; and beef cattle facilities at the Research and Education Center that are utilized by faculty and staff for conducting important research and training of graduate students. On-campus laboratories are equipped with instrumentation that allows trace mineral, vitamin, lipid, amino acid, hormone,

enzyme, stable, and radioactive isotope analyses. Facilities for meat and food processing are also available and support research and graduate student training.

Research Programs and Faculty Expertise

The department's faculty and professional staff uses a multidisciplinary approach to address research areas from the cellular level to production systems, with the ultimate goal of enhancing animal production efficiency, improving health and well-being of animals and people, improving quality of life in society, and providing consumers with a healthy, safe food supply. Current research efforts are a good blend of discovery and applied research.

Disciplines of research in AFS include human, ruminant, non-ruminant and equine nutrition, nutritional and anaerobic microbiology, physiology, genetics and animal breeding, and food science. Faculty and professional staff are involved in collaborative efforts with other scientists in the College of Agriculture, Food and Environment and other colleges within the University of Kentucky, as well as with investigators from other research facilities across the U.S. and the world. These kinds of collaborative efforts allow us to focus our research efforts on developing solutions to complex problems.

AFS faculty and staff play a key role in the University of Kentucky's Superfund Research Center that conducts biomedical and environmental research with the goal of minimizing the negative health and environmental impacts of organic chemicals found in hazardous waste sites. Other departmental personnel are leading efforts for the Food Systems Innovation Center, a multidisciplinary program involving collaborations between AFS, Agricultural Economics, Dietetics and Human Nutrition, and Biosystems and Agricultural Engineering, whose programs and activities help answer important questions for entrepreneurs involved in the local foods industry. Equine researchers in the department are an integral part of the college's Equine Program efforts and provide innovative nutrition research for one of Kentucky's signature industries.

Graduate Degree Programs

AFS provides opportunities for students to pursue doctorate (Ph.D.) and master's (M.S.) degrees in Animal Sciences. Graduate research work in the broad areas of nutrition, management, animal care and well-being, and reproductive physiology may be conducted with beef cattle, dairy cattle, horses, poultry, sheep, swine, and companion animal species. Students with interests in foods may specialize in meats, dairy products, food microbiology, muscle biology, or food chemistry.

Significant Achievements

The faculty, staff, and students in AFS received numerous acknowledgements of excellence, including:

- Dr. Robert Harmon received the 2017 National Mastitis Council Award of Excellence.
- Dr. Phil Bridges, Dr. Jamie Matthews, and Dr. Roy Burris received $29,544.19 for a 2017 Research Equipment Competition Award sponsored by the Office of the Vice President for Research (VPR).
- Dr. Dave Harmon received $10,683.98 for a 2017 Research Equipment Competition Award sponsored by the Office of the Vice President for Research (VPR).
- Dr. Richard Coffey elected President-Elect of Midwest Section American Society of Animal Science.
- Dr. Surendranath Suman received the 2017 CAFE Bobby Pass Excellence in Grantsmanship Award.
- Dr. Surendranath Suman received the 2017 CAFE Thomas Poe Cooper Research Award.
- Dr. Roy Burris received the 2017 CAFE High Impact Research/Extension Award.
- Dr. Gregg Rentfrow received a 2017 UK Teacher Who Made a Difference Award.
- Dr. Paul Vijayakumar received the 2017 Outstanding New Extension Faculty Award from the Kentucky Association of State Extension Professionals (KASEP).
- Dr. Gregg Rentfrow received the 2017 M.D. Whiteker Award for Excellence in Extension from the Kentucky Association of State Extension Professionals (KASEP).
- Dr. Tony Pescatore received the 2017 Outstanding Extension Coordinator Award from the Kentucky Association of State Extension Professionals (KASEP).
- Dr. Darrh Bullock received the 2017 Animal Industry Award given by the American Society of Animal Science.
- Dr. Bob Coleman appointed as the 2017 Executive Director for the Equine Science Society Board.
- Dr. Phillip Bridges (current Secretary for NE 1227 Ovarian Influences on Reproductive Success in Ruminants Technical Team) was the recipient of the NERA's 2017 Award for Excellence in Multistate Research.
- Bryan Cassill received the 2017 CAFE Outstanding Staff Award in Executive/Administrative Category.
- Ann Leed received the 2017 CAFE Outstanding Staff Award in Executive/Administrative Category.
- Ning Lu (Ph.D. student with Dr. Merlin Lindemann) was the third place winner in the Ph.D. poster competition at the 2017 Midwest Section American Society of Animal Science Annual Meeting.
- Morgan Pyles (M.S. student with Dr. Laurie Lawrence) selected to receive a $300 Travel Funding Award from the UK Graduate Student Congress.
- Caroline Loos (Ph.D. student with Dr. Kristine Urschel) received the first place award in the Equine Biosciences Section at the 2017 Equine Science Society Annual Meeting.
- Morgan Pyles (M.S. student with Drs. Laurie Lawrence and Michael Flythe) received third place in the Nutrition Section at the 2017 Equine Science Society Annual Meeting.
- Derek Nolan (Ph.D. student with Dr. Jeffrey Bewley) received third place in the Ph.D. Poster competition at the 2017 American Dairy Science Association Annual Meeting.
- Hannah Himmelman (undergraduate research project student with Dr. Jeffrey Bewley) was the first place winner in the Undergraduate Original Research Poster competition at the 2017 American Dairy Science Association Annual Meeting.
- Chelsea Folmar (undergraduate research project student with Dr. Jeffrey Bewley) received first place in the production division at the American Dairy Science Association Annual Meeting.
- Sarah Mac (undergraduate research project student with Dr. Jeffrey Bewley) received third place in the dairy foods division at the American Dairy Science Association Annual Meeting.

Biosystems and Agricultural Engineering

The Department of Biosystems and Agricultural Engineering at the University of Kentucky began its professional engineering curriculum in the fall of 1957. Through December 2017 the program has granted more than 550 bachelor of science degrees. The department currently has 18 full-time faculty members, 17 of which are in tenured or tenure-track titles and 1 who holds a lecturer title. The department currently hosts more than 200 undergraduate students and 29 graduate students. The department offers three degrees.

- Bachelor of science in Biosystems Engineering (BSBN)
- Master of science in Biosystems and Agricultural Engineering (MSBAE)
- Doctor of philosophy (Ph.D.)

The areas of specialization offered for undergraduate students are bioenvironmental engineering, food and bioprocess engineering, machinery systems automation engineering, controlled environment systems, pre-biomedical engineering, pre-veterinary medicine, and pre-med tracks. Research and Extension programs are active in bioenvironmental engineering, food and bioprocess engineering, machine systems automation engineering, and controlled environment systems.

Highlights

- Don Colliver is the director for the Kentucky Industrial Assessment Center (KIAC) funded by the U.S. Department of Energy. In 2017 KIAC performed 19 assessments resulting in recommendations for annual energy costs savings of $5,423,000, or 28 percent, of the annual plants' energy costs. The average implementation rate of the recommendations was 56 percent, with an estimated saving of $17.2 million and 0.16 million metric tons of CO_2 savings over seven years.
- The KIAC won the 2016 DOE IAC Center of the Year award.
- Joe Dvorak and Karin Pekarchik led a study abroad trip for fourteen BAE students in Germany during May.
- Sam McNeill and Doug Overhults completed 18 energy assessments for farmers and rural small businesses to upgrade equipment to improve energy efficiency, resulting in $2,264 saved per year for each producer.
- Two superior ASABE paper awards (Sama and Agouridis).
- Sue Nokes served as Treasurer for ASABE.
- Doug Overhults received the UK Gamma Sigma Delta Service Award and inducted into the Kentucky Poultry Federation Hall of Fame.
- Dr. Czarena Crofcheck received the Henry Mason Lutes Award for outstanding engineering education.
- Sue Nokes led a UK team on an NSF Track-2 EPSCOR grant with Louisiana State University. Dvorak, Goff, Jackson, Montross, and Sama received funding from USDA-NIFA. Stombaugh and Dvorak received funding from USDA-NIFA.
- Faculty attracted more than $1.9M of funding to the University and over $3.6M of collaborative funding.

Community and Leadership Development

The mission of the Department of Community and Leadership Development is to strengthen the capacities of individuals, organizations, and communities to act on their shared visions and challenges. We do this by basing our instructional and outreach programs on science-based research. The department was formed in 2002 and brought together faculty from rural sociology, agricultural education, agricultural communication, and program and staff development. Forming a new department necessitated changes and new approaches in how faculty approached their research endeavors as well as restructuring curricula at both the undergraduate and graduate levels. Undergraduate programs that were previously instruction-based (community communication and agricultural education, for example) now contain active and successful research components. Revisions to the graduate program led to strengthening the foundations of social science and research methods. Our overall focus is moving beyond the disciplinary approach of the past to a process stressing cross-disciplinary and collaborative partnerships in all aspects of our research, instructional, and outreach programs.

Research Programs and Faculty Expertise

All faculty in community and leadership development have doctoral degrees in their respective disciplines. They have strong training from major research universities in a variety of fields such as communication, education, rural sociology, community development, and cultural anthropology. Collaboration among our departmental faculty is very strong and extends to other units in the College of Agriculture, Food and Environment and other colleges on the UK campus, including College of Arts and Sciences, College of Medicine, College of Education, and College of Communications.

Significant Research Achievement, Honors, and Awards

Our diverse faculty have varied research interests, including:

- Agricultural education including the role of STEM, school scheduling impact on education, teacher efficacy and job satisfaction, and youth and adult partnerships
- Issues relating to community health, obesity, and supporting the health of SNAP-Ed
- Topics relating to beginning farmers, family farms and social relationships, sustainability, the role of marketing projects in Appalachia, and community food projects
- Communications in a community context, including issues relating to online journalism, citizen journalism, role of communication in community development, and community-based public health campaigns
- Environment and land use, labor of agro-diversity, and land and the role of politics and migration
- Land grant universities and knowledge in the Black Belt South
- Encouraging innovations and entrepreneurship locally, nationally, and internationally, including utilization of a community innovation lab to understand community engagement.

- Understanding communities and community development and the role of 4-H youth development in communities

Graduate Degree Program

The M.S. degree in community and leadership development at the University of Kentucky is a unique multidisciplinary program that prepares students for a broad range of careers or for pursuing a Ph.D. in several disciplines (agricultural education, agricultural leadership and development, communications, and rural sociology). The curriculum integrates a solid foundation in social science theory and research methods. Students are challenged to understand and then apply both theory and methods in diverse contexts as both independent and collaborative scholar/professionals. Graduate students are expected to be engaged professionals participating in scholarly organizations, social change initiatives, community development associations, or community media campaigns. They should demonstrate the depth and breadth of their knowledge and skills through applied service or research projects. Finally, students are expected to contribute their expertise as academic, organizational, and community leaders. Many of our faculty and students collaborate on research, teaching, or outreach projects. Their work often involves a partnership with citizen groups, community-based organizations, and/or state/local governmental units to address a particular set of social issues.

Dietetics and Human Nutrition

The Department of Dietetics and Human Nutrition (DHN) is committed to being FIRST, a student-centered department and, with the assistance of many community-based partners, offers a wide range of academic, research, and community development opportunities. Our core values are designed to support learning, discovery, and engagement and include:

- **F**ocus on the contributions to excellence in learning, discovery, and engagement.
- **I**nnovation in ideas will contribute to evidence-based best practices in the profession.
- **R**espect for others will allow service to others to be our highest priority.
- **S**uccess is reached by empowering all individuals to reach their full potential.
- **T**eamwork fosters partnerships between students, faculty, alumni, and community.

Two undergraduate programs—dietetics and human nutrition (350 students)—are offered, as well as a graduate program for an M.S. degree in nutrition and food systems. The B.S. in human nutrition offers appropriate preparation for further study or professional careers in nutrition and other health related fields, particularly medicine, dentistry, pharmacy, physician assistant, physical therapy, public health, food policy, and nutrition research. The B.S. in dietetics prepares individuals to be experts in the field of food and nutrition and is accredited by the Accreditation Council for Education in Nutrition and Dietetics (ACEND). Graduates are prepared to apply for dietetic internships to become eligible to sit for the national registry exam to earn the credential of registered dietitian nutritionist (RDN). An additional pathway to the B.S. in dietetics is acceptance into the DHN Coordinated Program in Dietetics, which includes the academic programing plus the dietetic internship. We offer a certificate in Nutrition and Human Performance in conjunction with partners from the College of Health Sciences and College of Education. DHN implemented a pilot transferable skills workshop to strengthen student personal statements, resumes, and personal brands.

Since community service is the cornerstone of DHN, opportunities abound for students to participate in meaningful experiential activities, especially related to food insecurity. This year a food access survey was conducted on campus to determine the prevalence of food and housing insecurity among UK students; in the future focus groups will prioritize appropriate solutions. DHN supports the Campus Kitchen at the University of Kentucky (CKUK). CKUK is a student service organization that provides a sustainable approach to reducing food waste while providing healthy meals to those struggling with hunger. CKUK recovered 3,325 pounds of food and served 1,785 meals last year. AmeriCorps VISTA oversees supervision of hunger-related opportunities for the 841 engaged students. In partnership with the Food Connection at UK, DHN offered Gather at the Table dinners to students experiencing food insecurity; participants paid what they could for a local, sustainably sourced and healthful meal accompanied by dialogue. Other DHN-supported organizations, such as Sustainable Solutions to Overcome Poverty (SSTOP) and Universities Fighting World Hunger (UFWH) provide platforms for student leadership development.

Research Programs and Faculty Expertise

DHN addresses community dietary-related issues through undergraduate and graduate education, research, and outreach/extension. All DHN undergraduate students participate in research projects that lead to poster sessions or presentations. Faculty are dedicated to finding innovative solutions to real-world problems facing the state of Kentucky, our nation at large, and the world beyond. Long-term goals are to reduce the risks of food insecurity, obesity, and chronic diseases and to contribute to evidence-based best practices in the profession of dietetics and human nutrition. This year, junior faculty added weight loss management with exercise physiology as a new focus of research.

DHN has state-of-the art facilities for educational and research purposes, including food preparation and food development laboratories and a BOD POD used for standard body composition assessment. To enhance our ability to meet the needs of the community, a nutrition assessment laboratory was fitted with upgraded body composition testing, resting metabolic measurement, and nutrition counseling by registered dietitians on staff. Faculty have expertise in food systems, food insecurity, nutrition and chronic disease, entrepreneurship, environmental contaminants, and weight loss management. Recent funding was awarded through national competitive processes from the National Institute of

Environmental Health Sciences; U.S. Department of Agriculture; National Heart, Lung and Blood Institute; Cooperative State Research, Education and Extension; National Institute of Food and Agriculture; and Centers for Disease Control.

Graduate Degree Program

DHN offers an M.S. degree in nutrition and food systems and seeks to educate students using a multidisciplinary approach emphasizing the impacts of food systems and diet on human health while exploring strategies to reduce the risk of chronic disease among individuals and communities. Our goal is to provide students with an expertise in nutrition and food systems that allows them to apply practical and critical thinking skills to nutrition-related problems in an evolving global society. One hundred percent of our graduate students are employed after graduation.

Significant Achievements

DHN is successful in empowering students, faculty, community partners, and clients to reach their full potential in determining their own health through education, research, and outreach/Extension. DHN is known for such programs as Food Insecurity and Accessibility; Plate It Up Kentucky Proud; Homebased Microprocessing; Lemon Tree Cafe; Superfund Nutrition Outreach; Children, Youth and Families at Risk; and Behavioral Mindful-based Weight Management. We have on staff two Provost Teachers of the Year; four Kentucky Academy of Nutrition and Dietetics Outstanding Dietitians of the Year; two participants of the Bluegrass Academic Leadership Academy, an initiative of the Bluegrass Higher Education Consortium; one participant of UK's Women Executive Leadership Development Program (WELD)—all indicating the strong leadership abilities of the faculty in the Department of Dietetics and Human Nutrition.

Entomology

The Department of Entomology is continually seeking opportunities to enhance our abilities to address the changing needs of our global citizenry and is dedicated to providing high-quality research, Extension, and instruction to meet those needs. Our department strives for creative synergies between fundamental and applied entomological research, developing long-term answers to entomological problems while providing answers that address immediate short-term needs. We integrate research, graduate education, and Extension activities to synergize our efforts, maximize our productivity, and enhance our effectiveness, and this approach has proven successful.

Historically, we played a key role addressing a critical need of the equine industry through the MRLS (Mare Reproductive Loss Syndrome) crisis. More recently our research, graduate education, and Extension activities are addressing pollinator protection and invasive species ecology and management in urban, agricultural, and natural resource settings. Our response to the global outbreaks of bed bugs and the Zika virus crisis demonstrate our proactive and progressive approaches to responding to critical needs of Kentucky, the nation, and the world.

Faculty in the department are dedicated instructors who take pride in their graduate and undergraduate teaching. Graduate course content is continually evaluated for relevance and effectiveness. Our faculty are actively involved in a number of undergraduate degree programs, including Agricultural Biotechnology (ABT), Sustainable Agriculture, and an individualized program in ecntomology within the B.S. program in agriculture. Faculty teach undergraduate courses that are key components of several majors within the College of Agriculture, Food and Environment (CAFE) (e.g., forestry, horticulture, and plant and soil sciences) and Arts and Sciences (biology). Each semester for the past 15 years the department has taught a course (ENT 110) that fulfills a natural sciences requirement in the current University Studies Program (USP) at the University of Kentucky. Faculty are actively engaged in mentoring undergraduate students in research topics that stimulate creative thinking and enhance the undergraduate learning experience while providing a mechanism to support graduate education and contribute to individual research programs.

Research Programs and Faculty Expertise, Facilities, and Capabilities

Protection of Natural Resources from Invasive Pests

The Rieske-Kinney's research group integrates field and laboratory approaches to address behavioral and ecological issues in forest ecosystems in the context of herbivore-plant relations, feeding guild interactions, and interactions among plant stressors. With an emphasis on invasive species, this group is evaluating how disturbance forces directly and indirectly impact arthropod abundance, herbivory and herbivore success, and forest community dynamics, and employs integrative approaches to develop mitigation strategies. The Rieske-Kinney and Palli labs teamed up with USDA collaborator Dr. Duan Jian to develop RNAi-based methods to control insects that attack trees.

Community Entomology

Dan Potter's research program supports sustainable management of insect pests and conservation of pollinators, natural enemies, and other beneficial insects in urban, recreational, and suburban landscapes. This group works at the interface of applied ecology and integrated pest management to clarify the interactions between plants, pests, and beneficial invertebrates, and their responses to anthropogenic disturbances such as pesticide inputs and habitat modification. For more than 38 years this program has generated a substantial portion of the world's primary literature on Japanese beetles, root-feeding white grubs, scale insects, wood borers, and other key pests of urban landscapes while providing guidelines and leadership for implementing conservation biological control, host plant resistance, and urban biodiversity conservation.

The Haynes laboratory conducts research on bed bug biology, behavior, and control. The reemergence of this blood-feeding insect as a major pest in the urban environment has led to focused attention on a wide range of issues related to their biology and control. This group has de-

termined that resistance to pyrethroids is widespread and is likely the major factor in the recent resurgence of bed bugs. Our discovery of this insecticide resistance, which has been corroborated by several other groups, has fundamentally changed the way the pest control industry deals with this pest and undoubtedly resulted in improved pest management procedures. These pest management procedures include the use of combination products as alternatives to pyrethroids (typically a pyrethroid and a neonicotinoid), inhibitors of oxidative phosphorylation (such as chlorfenapyr), and desiccants (most notably silica gel). Collaborations among Haynes, Palli, and Mike Potter pursued research on bed bugs in diverse and exciting directions, including identification of genes responsible for insecticide resistance among bed bug populations collected from across the United States. They have also collaborated with UK Agricultural Economics on assessing impacts of bed bugs on the hotel and lodging industry.

Medical Entomology-Disease Vector Management

The invasive Asian tiger mosquito *Aedes albopictus* is a significant biting pest and competent vector in a large portion of the United States, including Kentucky. A component of the current research in the Dobson lab is dedicated to understanding how *Aedes albopictus* behaves in a non-endemic habitat. Ongoing research is centered on a series of mark-release-recapture (MRR) experiments in which both traditional and novel insect marking technologies are applied to mark non-biting male mosquitoes, which are released into the environment and then recaptured at various times thereafter. Results obtained from this research will help estimate dispersal, longevity, and relative population sizes in the field, which will enhance understanding and the ability to control this pest species. The interaction between mosquitoes and their *Wolbachia* infections, which are obligate, intracellular bacteria that can affect insect reproduction, are also being studied. In addition to characterizing the general impacts on mosquito fitness, we are also developing strains and strategies that may be used for manipulating medically important mosquito populations. We are currently collaborating with an abatement district in California to field trial a mosquito-suppression approach.

The Brown laboratory provides teaching, research, and service regarding insect-borne diseases and other arthropod-related human health problems. The lab provides services to the professional and lay community in the area of public health education. They maintain a reference collection of the commonwealth's mosquito fauna, as well as other arthropod vectors. Insomuch as possible, the lab provides mosquito, tick, sand fly, and other vector identifications for state and county public health authorities, and answers questions from the public and media concerning public health entomology issues. The lab carries out cooperative research projects with many varied organizations, both public and private. These programs include disease surveillance programs, vector ecology research, and public health education. Laboratory staff are available to address questions from the media concerning insects and other arthropods posing a public health threat.

Fundamental/Translational Research

Interfering with regulatory mechanisms involved in critical physiological processes such as molting, metamorphosis, diapause, and apoptosis can result in the death of pest insects. Studying some of these processes of pest insects and disease vectors at the molecular level may help in the identification of targets that can be used for pest and disease vector control. The Palli laboratory uses whole genome sequence data and functional genomics approaches including transcriptomics, metabolomics, RNA interference (RNAi), and genome editing to identify genes that are critical for the survival of insects. The genes identified are being used to develop high throughput screening assays for identification target-specific insecticides, as well as to perform toxicogenomics and pharmacogenomics that can help to elucidate the effects of candidate pesticides on the pest ecosystem.

Environmental stress is a major determinant of insect population dynamics and species ranges. The Teets's lab investigates the physiological and molecular mechanisms by which insects tolerate environmental stress using an integrative approach to understand stress at the molecular, cellular, organismal, and population level, with a particular focus on stress associated with overwintering. Overwintering conditions vary strongly across latitudinal gradients, and climate change is leading to warmer and more variable winter conditions. Three specific areas of research in this lab are (1) investigating the cellular and molecular mechanisms governing rapid responses to low temperature, (2) integrating physiology and genomics to understand arthropod adaptations to Antarctica and other extreme environments, and (3) investigating the genetic basis of freeze tolerance, i.e., the ability of select insects to survive internal freezing. While much of this research is basic, there is also interest in applications of insect stress biology; specifically, an ongoing project funded by the USDA which uses transgenic methods to enhance the stress tolerance of insects used in sterile release programs. Insights from cold tolerance work may inform organ cryopreservation efforts.

Insect diseases ubiquitously affect populations of beneficial and pest insects. The Webb lab focuses on the effects of insect viruses of Lepidoptera to understand both their beneficial role in controlling insect populations and how insect viruses may be modified to regulate and control lepidopteran pest populations. Research in the Zhou lab is focused on the understanding of (1) the genetic underpinnings govern social behaviors in eusocial termites and (2) the evolution of eusociality in the wood-feeding dictyopterans. This research is particularly interested in genes potentially affecting caste differentiation (worker-solider and worker-reproductive transition, respectively) and termite behaviors (aggression, isolation, undertaking, learning and memory, foraging, and parental care).

The Rittschof laboratory studies the evolutionary consequences and mechanistic underpinnings of behavioral plasticity, particularly in the context of social interactions that influence health and immune function as well as behavior. Current research focuses on socially induced variation in aggression and other aggression-related behavioral phenotypes in the honeybee, as well as the neurobiological underpinnings of these behaviors. Aggression in honeybees is of particular interest because research shows that high

aggression is associated with health resilience. This research combines perspectives from behavioral ecology, behavioral genomics, and neuroscience.

The Fox group works on the evolution of insect life histories and behavior and the scientific peer review process. The primary focus of the research continues to be at the interface of ecology, evolutionary biology, behavior, and genetics of insects. Our major projects over the past couple of years have focused on four themes: adaptation to new environments (a long-term experimental evolution experiment using the agricultural pest seed beetle, *Callosobruchus maculatus*), the mechanisms underlying adaptive life history plasticity in a seed beetles that exhibits plasticity in egg size (using the non-pest seed beetle, *Stator limbatus*), the ecology and genetics of inbreeding depression, and the evolution of genital spines and mating behavior in response to sexual conflict in seed beetles. The inbreeding depression work focuses on (1) the genetics and environmental sensitivity of inbreeding depression (especially focusing on responses to stress), (2) the influence of inbreeding on the evolution of mating behavior, and (3) how mating behavior mediates inbreeding and inbreeding depression.

Research in the Sharkey lab focuses largely on the taxonomy, phylogenetics, and systematics of parasitic wasps in the family Braconidae. Members of this family are parasitoids of other insects and many are important in the natural and biological control of insect pests. The major goals are to produce phylogenetic hypotheses (classifications) for genera and higher taxa of selected parasitic wasps and to describe and provide identification keys for constituent taxa. In doing so, they have increased in the specimen holdings at the Hymenoptera Institute and other museums for comparative and morphological study. In the past five years, they deposited thousands of specimens identified to species. By providing identification services, the program benefits by being able to catalog specimen information, and the museums benefit by having their specimens identified by world-recognized experts. They added digital information on thousands of braconid specimens to an ever-growing, web-accessible Integrated Digitized Biocollection (IDigBio)–supported database (http://symbiota4.acis.ufl.edu/scan/portal/index.php). They developed and published a better understanding of the relationships among braconid wasps and their host associations. This knowledge could aid in biological control efforts in cases where one or more hosts become pests, as species-specific parasitoids have been among the most successful biological control agents. Research has led to a better understanding of the identification and phylogenetic relationships of the parasitoid species contained within, which is essential information when developing biological control programs.

Agricultural Entomology: Sustainable IPM

The long-term goals of the Obrycki research group are to improve human attempts to manipulate and enhance populations of predatory insects based on a fundamental understanding of population-level variation in these natural enemies. Human-assisted movement and release of insect parasitoids and predatory insects for the suppression of arthropod pests represent one of the major practices of biological control. Delineating the population structure of widely distributed species provides a strong basis for understanding population-level differences, which in species manipulated by humans may be critical to understanding the consequences of our activities.

Recent efforts in the White lab have revealed that a facultative symbiont dictates the breadth of host plants attacked by an agricultural pest, the cowpea aphid. Such findings have major implications for understanding sudden shifts in crop attack patterns by pest insects. We have subsequently started collaborating to characterize bacterial symbionts in a different aphid, the sugarcane aphid, which has recently exhibited such a host plant shift, to devastating effect in sorghum crops.

RNAi has become a widely used reverse genetic tool to study gene function in eukaryotic organisms and is being developed as a technology for insect pest control. Four laboratories in this department (Palli, Rieske-Kinney, Webb, and Zhou) are working on RNAi. The Palli and Webb labs are developing methods for using nanoformulation of double-stranded RNA to control insects that attack crops and trees and transmit infectious diseases. The lack of standardized ecological risk assessment procedures is considered by many to be the bottleneck for establishing RNAi as a viable pest control alternative. Research in the Zhou laboratory is focused on (1) the development of an ecological risk assessment framework to assess the potential risks associated with RNAi transgenic crops and (2) the integration of RNAi into pest control practices against urban pests, including dsRNA-mediated baiting system for termite control.

Graduate Degree Programs

The Department of Entomology offers graduate work leading to the Master of Science (Plan A—thesis and Plan B—nonthesis) and the Doctor of Philosophy degrees. The graduate student handbook is updated as needed and is available on the department's website (http://www.ca.uky.edu/entomology/dept/gradprogram.asp). Individual graduate programs are planned by students in consultation with their advisor, advisory committee, and the director of Graduate Studies. Study and research are available in various areas of entomology including applied entomology, behavior, biochemistry, biological control, ecology, genetics, plant resistance, insect biology, medical and veterinary entomology, molecular biology, physiology, systematics, and taxonomy. The discipline of entomology, similar to all agricultural and biological sciences, has evolved significantly during the past two decades and continues to undergo rapid changes. To increase flexibility in the core curricula, the Ph.D. and M.S. core curricula are the responsibility of the graduate faculty in Entomology, which represents a change from prior responsibility at the graduate school level.

Student Achievements

Entomology students presented at many conferences and won numerous awards. A few notable examples:

- Ph.D. student Smitha George won the Excellent Presentation Award at the 2017 International Congress of Entomology (ICE) Conference.
- M.S. student Adam Baker won the Gamma Sigma Delta Outstanding Graduate Student Award for 2017.
- Ph.D. student Smitha George, Ph.D. student Emily Nadeau, and M.S. student Sarah Preston won first place in the ESA 2017 student competition for the president's prize.

- M.S. student Andrea "Glenn" Skiles received a $1,000 travel award to attend the American Mosquito Control Association's Washington Day.
- Ph.D. student Leslie Potts won the UK Women's Club Graduate Student Scholarship for 2017.

Faculty Awards and Honors

- S. Reddy Palli won the 2017 ESA Nan-Yao Su Award for innovation and creativity in entomology.
- Jennifer White won the George E. Mitchell Award for Service to Graduate Students from GSD.
- S. Reddy Palli was named fellow of the American Association for Advancement of Science.
- Michael Potter won KPMA's Lifetime Achievement Award for his dedicated service to the pest management industry in Kentucky.

Family Sciences

Family Sciences is a strong unit that makes significant contributions to the College of Agriculture, Food and Environment and the University of Kentucky. The department generates some of the highest student credit hours in the college, our majors contribute to the university's compelling interest in diversity, and our research productivity (controlling for research distribution of effort) is one of the highest in the college. Our research profile is enhanced by the fact that two faculty members in the department edit respected journals in our field. The department includes two active research labs: the Adolescent Development Lab directed by Alexander Vazsonyi and the Family Interaction Research Lab directed by Ronald Werner-Wilson, both supported by endowments.

Our graduate program has continued to grow, and we have recruited more diverse students, including international students and students from traditionally underrepresented groups. We successfully mentor these graduate students by providing them opportunities to publish with faculty members, and they are graduating and successfully competing for positions. Faculty mentoring is occurring throughout the department as more faculty members are supervising theses and dissertations.

We have systematically investigated appropriate online course delivery and have received approval to teach several courses online. We identified a handful of courses that seemed appropriate to this delivery strategy and identified tactics to ensure rigor and minimize academic misconduct (i.e., requiring Proctor U for all online courses offered by our department) that can plague this approach to teaching. We have also become more active in providing study abroad opportunities to students, including experiences in Greece, Korea, Japan, and Costa Rica.

Forestry

Kentucky has 12 million acres of ecologically and commercially valuable forests, covering nearly one-half of the Commonwealth, and the Department of Forestry and Natural Resources (FNR) focuses on providing research-based solutions to critical local and global forest and related natural resources issues. Science informs our Bachelor of Science in Forestry degree program, the only professionally accredited forestry program in Kentucky, and our Master of Science in Forest and Natural Resource Sciences program. Our research faculty also play a key role in the College of Agriculture, Food and Environment's portfolio of natural resource programs including the undergraduate Natural Resources and Environmental Science degree program as well as mentoring students through several of the college's M.S. and Ph.D. programs such as the interdisciplinary Integrated Plant and Soil Sciences program. The engagement of our research faculty in a broad array of undergraduate and graduate programs ensures that society continues to have a pipeline of professionals who can bring cutting-edge science to address significant economic, ecologic, and social issues that impact the well-being of our forests, natural resources, and society as a whole.

Our thirteen faculty members produced over 100 research products and resources in 2017. This research was used by our nationally recognized forestry Extension program providing science-based management strategies and alternatives for critical wildlife, forest, and water related issues. In 2017 our Extension faculty and staff reached over 1 million individuals and/or businesses through web, direct mail, and 222 face-to-face programs. Practice adoption rates ranged 15 to 98 percent impacting 471,528 acres, resulting in a direct economic contribution of over $95 million dollars saved or earned. The forest impacted by our research supplies the resource for a significant portion of Kentucky's $13 billion forest industry while providing significant eco-system services contributing to Kentucky's rich biologic diversity. Our department fully recognizes the importance of our contribution to sustainable management of the state's forests and related resources as reflected in the department's stated mission "to enhance the ecological, economic, and social benefits of forests and related natural resources to elevate the quality of life for Kentuckians and beyond."

In summary, FNR focuses on supporting the College of Agriculture, Food and Environment in striving to promote the integration of research, instruction, and Extension. The scope and economic importance of forests and forestry make it imperative that we continually work to discover new knowledge, address issues of importance, and impart our findings to the Commonwealth, the nation, and the world.

Horticulture

The Department of Horticulture continues to move toward a position of national leadership in organic and sustainable horticultural production practices. It also continues as a major player in the College of Agriculture, Food and Environment for undergraduate programs in sustainable agriculture, horticulture plant science, agriculture and medical biotechnology, and the undergraduate certificate program in distillation, wine, and brewing sciences. The department has basic and applied research programs with national and international reputations particularly in the area of biofuels, plant microbiomes, cellulose metabolism, life-cycle analyses, agroecology, seed biology, and basic plant physiology and biochemistry. Our most productive young faculty members are taking active roles throughout the college and university and are shaping the future of the department. The department has had a significant increase in the number of competitive grant dollars and research publications per FTE in research, as well as an increase in the quality of publications over the past two years. The department's research farm is home to a 30-acre organic farming unit and the Community Supported Agriculture program. Horticulture graduate faculty actively participate in the integrated plant and soil science graduate program by teaching in graduate level courses and mentoring graduate students. The department hired two new faculty members scheduled to start in 2018. Horticulture faculty and staff have received numerous awards and recognition in 2017, including:

- Dr. Krista Jacobsen was named winner of the Gamma Sigma Delta Master Teacher Award.
- Dr. Krista Jacobsen accepted the position of interim director of the Tracy Farmer Institute for Sustainability and the Environment.
- Dr. Krista Jacobsen attended the Fast-Track Leadership training at Chapel Hill, NC.
- Ms. Monica Shuler received a $1,000 award from the dean's office in support of professional staff improvement activities.
- Ms. Shari Dutton received a $1,000 award from the dean's office in support of professional staff improvement activities.
- The department hosted a dinner reception at our organic research farm for Mr. John Piotti, the American Farmland Trust regional leader.

Landscape Architecture

The primary mission of the Department of Landscape Architecture (LA) is the B.S. degree in Landscape Architecture degree program, which prepares students for entry into the profession of landscape architecture. The University of Kentucky has the only program in the Commonwealth accredited by the Landscape Architectural Accreditation Board. The department serves as the academic home for *Landscape Journal,* the premier academic journal in landscape architecture, edited by Professor Brian Lee. Among many efforts to advance the journal, he led a research and publishing workshop in Beijing, Peoples Republic of China, as part of his responsibilities as editor.

Research in the department is largely in the areas of design thinking and metacognition, geospatial analysis, stream morphology and change, and cultural landscape preservation. The department also engages in an active program of community design assistance, led by Extension faculty member Jayoung Koo, who collaborates with the college's Community Economic Development Initiative of Kentucky.

Highlights

- Jayoung Koo and LA Extension Program Manager Ryan Sandwick, working with other CEDIK Extension faculty and staff, are facilitating design and planning work in communities that are re-envisioning their downtowns to become vibrant places that support social, economic, physical, and civic opportunities. This work is part of CEDIK's Regional Downtown Revitalization program in cooperation with a range of regional and local partners in the Kentucky Promise Zone.
- Ryan Hargrove's program in pedagogical research in metacognition and creative thinking contributes to an important body of research in design education and directly benefits students beyond the landscape architecture degree program. The 2017 Gear-up program led by Dr. Hargrove immersed a group of high school students into creative thinking methods in a three-week residential program at the university. The Creative Study Tour annually connects UK students with the country's most creative people in a variety of disciplines including cooking, songwriting, and architecture; visiting their workplaces for dialog about their creative processes.
- Research by Ned Crankshaw, Brian Lee, and other collaborators using remote sensing techniques for cultural landscape preservation has led to development of innovative methods for historic rural site documentation. Lidar-derived elevation models and pan-chromatically sharpened historic aerial photographs are able to yield information on linear feature locations and vegetation patterns over large areas, significantly reducing fieldwork effort.
- A multi-year effort by Brian Lee and collaborators has resulted in the publication of an edited book entitled *Water in Kentucky* that includes chapters from faculty, staff, and graduate students in Forestry and Natural Resources, Biosystems and Agricultural Engineering, Agricultural Economics, Plant and Soil Science, and the Dean's Office as well as authors from institutions across the Commonwealth.
- With co-principal investigators at Purdue University–Agronomy, Brian Lee completed work on a Higher Education Challenge Grant focused on a new digital tool to help teach how to read the landscape through the location and interpretation of soils. Users access the tool through an iPad application as well as Soilexplorer.net. This digital tool has been shown to improve student understanding of large-scale landscapes in several courses.

- Chris Sass has focused his applied research on using GIS strategies and models to aid in the understanding of the urban forest canopy within Lexington's Urban Service Boundary. In addition, this research begins to address social ills linked to a lack of urban forest in long neglected areas of town. Implementation of this model to guide urban canopy planting strategies will help in advancing social justice and increasing low impact development throughout new development areas.
- Ned Crankshaw was named to the Council of Fellows of the American Society of Landscape Architects.

Plant and Soil Sciences

An overarching goal in the Department of Plant and Soil Sciences is to improve, through scholarly research, the understanding of plant and soil systems as sustainable resources for human use while preserving and enhancing environmental quality. We address a broad subject matter including the chemistry, physics, and biology of plant, soil, and environmental systems ranging from the molecular, to the whole plant, to the ecosystem scale. This diverse research portfolio underlays our participation in the Integrated Plant and Soil Sciences graduate program. The department includes 46 full-time faculty members and nearly 50 graduate students and 60 staff employees. Our distribution of faculty effort is approximately 50 percent research with the remainder divided between Extension, administration, and instruction. Over the past five years the department has averaged $3,870,091 annually in extramural funding and in 2016–2017 received $213,223 in grant funding per full-time researcher. Both numbers are higher than those reported last year.

Many of our students are enrolled for M.S. and Ph.D. degrees in the relatively new Integrated Plant and Soil Sciences program, however students are still also receiving degrees from several legacy programs.

Highlights

- The grain crops and soils programs, with heightened visibility resulting from the investment in the Grain and Forage Center for Excellence, are addressing the challenges of maximizing crop production while preserving environmental quality. Responding to rising population, food demands, and climate change, projects explore the potential for irrigation to boost yields in Western Kentucky, best management practices, and technology to keep nutrients on fields and out of waterways, using breeding to improve crop nutrient use efficiency, and exploring new specialty crops. An NIFA-AFRI–funded grant will enhance undergraduate training in applied agronomic research and Extension.
- The industrial hemp research program has grown substantially, reflecting Kentucky's unique early-adapter position in the U.S. Our industrial hemp agronomic program leads the way in developing production recommendations, evaluating varieties, identifying challenges and knowledge gaps for U.S. hemp production, and exploring alternative usages for hemp. Because of our unique position, the program hosted a large, national-level hemp meeting in Lexington in September.
- Spurred by recent, serious herbicide application issues and by the continuing identification of herbicide-resistant weeds in Kentucky and beyond, the weed science group has been active in conducting Dicamba trainings, disseminating information regarding the issues surrounding this herbicide and best management practices, and investigating new strategies for weed management and control.
- Four competitive grants, totaling almost $1M, were received to support research exploring ways to improve nanoparticle delivery and understand the environmental fate of nanomaterials.

Plant Pathology

The mission of the Department of Plant Pathology is to improve understanding of plant disease through research, and to utilize this knowledge to educate students, producers, and other stakeholders in Kentucky about plant disease management. The department promotes plant health throughout the Commonwealth and encourages the use of economical, science-based disease management practices intended also to minimize negative environmental impacts. The department closely integrates research, Ph.D. and M.S. degree programs, numerous undergraduate internships, and Cooperative Extension and other outreach programs.

In 2017, peer-reviewed publications addressed plant pathogenic viruses, bacteria, fungi, oomycetes and nematodes, several first reports of plant diseases in Kentucky, and management of diseases in numerous crops such as soybean, wheat, kale, and sorghum. Research included major advances in plant mechanisms of disease resistance, virus replication and evolution, genomics and evolution of plant-pathogenic and endophytic fungi, genetics of endophyte toxins and endophyte-tall fescue interactions. These research programs were supported by grants from the U.S. Department of Agriculture, National Science Foundation, National Institutes of Health, Kentucky Science and Engineering Foundation, United Soybean Board and Kentucky Soybean Promotion Board, and corporate sponsors such as Alltech (Nicholasville, KY) and Takeda Pharmaceuticals, as well as generous commodity support.

The department also maintains plant disease diagnosis laboratories on the Lexington and Princeton campuses, which analyzed 2,808 plant samples and made a total of 3,507 disease diagnoses. These laboratories provide up-to-date diagnostic records integrated with the Southern and National Plant Diagnostic Networks and are essential for timely and effective Cooperative Extension programs for growers and other stakeholders.

Retailing and Tourism Management

The Department of Retailing and Tourism Management (RTM) is committed to excellence in teaching, service, and research resulting from innovative interdisciplinary education with a global, product, and consumer focus. As set forth by the mission, vision, and goals of the university, the teaching, research, and service programs support student development and contribute to the economic and social well-being of the Commonwealth, the nation, and the world. Students build outstanding business and customer service competencies in retail and hospitality organizations in a changing society. Opportunities are provided for experiential education through industry-related work experiences, internships, study tours, and exchange programs. Graduates are prepared for careers in the merchandising, hospitality, and tourism industries in the developing experience economy. The department offers the B.S. and M.S. Retailing and Tourism Management.

The vision of the new Department of Retailing and Tourism Management is to produce students who are globally, product, and consumer focused and who have a competitive foundation in the developing experience economy. Faculty have increased the student participation in study abroad programs through fundraising and scholarships. The development of an advisory board has created a resource that provides students with more industry-related exposure and in-class student engagement. Research done by faculty on soft skills development warranted the need to revise upper level courses to include soft skills curriculum. The department has expanded educational opportunities for student learning by developing an online master's degree. The program began in fall 2017 with five students.

Graduate Degree Programs

RTM graduate students have the option to complete their master's work through an internship experience. Students in our program can now choose to complete their program through three different pathways: thesis, non-thesis, or an internship project. The internship project allows students to get real hands-on experience in a retailing/merchandising field. The graduate program internship is set with higher expectations than an undergraduate internship, as students are expected to be at a managerial or corporate level to complete their work. Students complete a semester-long internship then present their findings and suggestions for the business in their internship defense. The new pathway provides unique and beneficial ways for students to shape their master's degree to match future career goals.

Merchandising, Apparel, and Textiles

Students are given the option to choose a thesis or non-thesis track to complete their degree. A non-thesis track is an alternative option for students who wish to complete a creative project focusing on the application of new or existing knowledge. A non-thesis student's research culminates into an actual project such as a mini clothing line, a business plan, or curation of a costume collection. The M.S. degree in merchandising, apparel, and textiles offers students unique and imaginative options for completing their graduate degrees. The applicant is expected to have an undergraduate degree in merchandising, apparel, and textiles, or a closely related field.

Hospitality Management and Tourism

A combination of course work, independent study, and research experience compile the hospitality management and tourism graduate curriculum to provide students with a program of study designed around future career goals. Students are given the option to choose a thesis or non-thesis track to complete their degree. A non-thesis project is an alternative option for students who wish to complete a creative project focusing on the application of new or existing knowledge. The applicant is expected to have an undergraduate degree in hospitality management and tourism, or a closely related field.

Online Master's Degree Program

As of fall 2017, the University of Kentucky College of Agriculture, Food and Environment has launched its first online master's degree program in retailing and tourism management. This offering is an opportunity to reach those professionals already working in the industry who want to take that next step with their careers but can't quit their jobs and come to campus. The online program offers the same content professors teach in classrooms. The same professors who lead the on-campus classes will lead the corresponding online courses. Each online class has an identical platform to maintain consistency and create familiarity within the program for students. Students in the online program may also choose to complete an internship instead of a thesis to graduate.

Faculty Expertise

Faculty have continued to develop and publish in areas important to enhancing the literature in the area of retailing and touring management. Topics include food tourist segmentation (cross-cultural comparisons between China and America), impulsive tourist shopping, cross-cultural research, social media and hospitality and tourism management, the concept of loyalty in hospitality and tourism, and the theoretical development, practice, and future research directions.

Veterinary Science

The mission of the Department of Veterinary Science is to assure the health and viability of animal agriculture through teaching, discovery, research, and service. The dissemination of new knowledge and information generated from these activities to our stakeholders is of paramount importance to our program. Faculty in the Department of Veterinary Science frequently collaborate on research projects with faculty in UK's College of Agriculture, Food and Environment and the College of Medicine, and with veterinarians in Central Kentucky and scientists at other institutions worldwide.

The overriding research goal of the department is to improve the health and well-being of the horse through the generation and application of new knowledge. Research programs within the Department of Veterinary Science encompass various disciplines, including infectious disease, immunology, para-

sitology, reproduction, musculoskeletal diseases, genetics, and pharmacology.

The infectious disease group focuses on ways to improve the diagnosis, treatment, and prevention of diseases caused by important equine pathogens, including equine arteritis virus (Timoney, Balasuriya), equine herpesvirus (Balasuriya, Chambers), equine infectious anemia virus (Issel, Cook), and equine influenza virus (Chambers), as well as those bacterial infections caused by *Rhodococcus equi* (Horohov, Shaffer). The research emphasis of the immunology program focuses on immune function and dysfunction in foals (Horohov), aged horses, and those with endocrinopathies (Adams). Parasitology research focuses on ways to reduce the impact of parasitic infections through improved diagnostic and treatment strategies against intestinal worms (Nielsen, Lyons) and *Sarcocystis neurona* (Howe), the cause of equine protozoal myeloencephalitis. This work includes the development of a novel technology for determining parasite burdens in horses (Nielsen), identification of the development of anthelmintic resistance (Lyons), and host-parasite interactions (Nielsen, Howe). The reproduction group (Ball, Esteller-Vico, McDowell, and Troedsson) works on various aspects of equine fertility and the regulation of pregnancy, including embryonic development. The musculoskeletal group continues to work on the molecular regulation of chondrocytes (MacLeod) as well as the underlying molecular basis for equine stenotic myelopathy (Janes). There is also continued interest in understanding the underlying and predisposing pathologies associated with racing-associated breakdowns (MacLeod, Kennedy, Janes). The genetics group contributes to our overall understanding of the equine genome and its role in various diseases of the horse (Bailey, Balasuriya), as well as providing genetic testing services to various breed organizations (Graves). The pharmacology program continues its focus on the effect of environmental contamination on racehorse blood testing results (Tobin).

The education mission of the Department of Veterinary Science focuses on providing opportunities for our students to develop the skills necessary to become the next generation of scientists. There are currently 20 Ph.D. and 3 M.S. students in our department. These students are distributed throughout each of the research disciplines in our program. Their research projects address important issues of equine health ranging from discovery of science approaches using state-of-the-art cellular and molecular techniques through translational studies with direct clinical applications. There are also four post-doctoral scientists in the program and a visiting scientist from UC Davis. We also host students from other departments and universities who work on research projects with our faculty.

The service mission of the department includes the diagnostic services provided by the UKVDL (detailed elsewhere), genetic testing services provided by the Genetics Testing Laboratory, and our programmatic outreach efforts. These efforts include lay publications (*Equine Disease Quarterly*), e-publications (*Bluegrass Equine Digest*) and the hosting of seminars and meetings that inform veterinarians and other stakeholders of our most recent research accomplishments. The faculty also provides expert consultation service to various segments of the equine industry, serve on university committees, and participate in national and international professional organizations.

Kentucky Agricultural Experiment Station Projects

Hatch, McIntire-Stennis, and Animal Health projects for calendar year 2017, as reported in the USDA Current Research Information System (CRIS) database, follow.

Agricultural Economics

Agricultural and Rural Finance Markets in Transition (NC1014, NC221, NCT-194)—*Freshwater, D.*

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.*

Equine Markets and Economic Decision Making in the Equine Industry—*Stowe, C.*

Food Safety Incidents and the Food Supply Chain: The Impacts on Consumers and Producers and the Price Analysis and Dynamics of Price Adjustment along the Food Supply Chain in an Environment of Food Safety Incidents and Highly Integrated Monopolistically Competitive Agriculture and Food Industries—*Saghaian, S.H.*

Food Safety Standards and Certification: Implications for Producers and Certifiers—*Zheng, Y.*

Modeling and Testing Kentucky Farmers' Use of Climate and Weather Forecasts—*Kusunose, Y.*

Strategic Response of Supply Chain Managers and Food Industry Leaders—*Saghaian, S.H.*

The Impact of Enhancing Community Capitals on Rural Economic Development—*Davis, A.*

The Importance of U.S. Food and Agricultural Trade in a New Global Market Environment—*Reed, M.*

Animal and Food Sciences

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.*

Effects of Selenium in Free-Choice Mineral-Vitamin Mixes on Genes, Proteins, and Metabolites of Beef Cattle Consuming Endophyte-infected Tall Fescue.—*Matthews, J.C.*

Enhancing the Competitiveness and Value of U.S. Beef—*Suman, S.*

Enteric Diseases of Food Animals: Enhanced Prevention, Control, and Food Safety—*Newman, M.*

Environmental Pollutants, Nutrition, and Vascular Endothelial Cell Function—*Hennig, B.*

Factors Affecting Phosphorus Concentrations and Phosphorus Digestibility in Pasture Herbage Consumed by Grazing Animals—*Lawrence, 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.*

Management Systems to Improve the Economic and Environmental Sustainability of Dairy Enterprises (Rev NC-1119)—*Bewley, J.M.*

Mastitis Resistance to Enhance Dairy Food Safety—*Bewley, J.M.*

Metabolic Relationships in Supply of Nutrients for Lactating Cows (NC 1009)—*McLeod, K.R.*

National Animal Nutrition Program—*Cromwell, G.L.; Lindemann, M.*

Nutritional Systems for Swine to Increase Reproductive Efficiency—*Lindemann, M.*

Ovarian Influences on Embryonic Survival in Ruminants—*Bridges, P.J.*

Poultry Production Systems and Well-being: Sustainability for Tomorrow—*Adedokun, S.*

Regulating the Signaling Pathways that Determine Skeletal Muscle Mass—*Urschel, K.*

Biosystems and Agricultural Engineering

Animal Production Systems: Synthesis of Methods to Determine Triple Bottom Line Sustainability from Findings of Reductionist Research—*Taraba, J.*

Development of a Distributed Control and Data Acquisition System for Variable-rate Applications in Precision Agriculture—*Sama, M.*
Engineering for Food Safety and Quality—*Adedeji, A.*
Integrated Systems Research and Development in Automation and Sensors for Sustainability of Specialty Crops—*Dvorak, J.*
Mechanisms of Gene Regulation during Plant Embryogenesis—*Perry, S.*
Quantification of Best Management Practice Effectiveness for Water Quality Protection at the Watershed Scale—*Edwards, D.*
The Science and Engineering for a Biobased Industry and Economy—*Shi, J.*

Community and Leadership Development

A Framework for Secondary Schools Agriscience Education Programs that Emphasizes the STEM Content in Agriculture—*Epps, R.*
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.*
Understanding Rural Economic Dynamics in Appalachian Kentucky: Rural Livelihood Strategies and Access to Productive Resources—*Rignall, K.*

Entomology

A Sustainable Approach for Protecting Our Forests from Emerald Ash Borer, with Applications to Other Exotic Wood-boring Invaders—*Rieske-Kinney, L.*
Bacterial Symbionts and Defensive Traits in Insects—*White, J.*
Biological Control in Pest Management Systems of Plants—*Harwood, J.D.*
Biological Control of Arthropod Pests and Weeds—*Obrycki, J.*
Biological Improvement of Chestnut through Technologies that Address Management of the Species, Its Pathogens and Pests—*Rieske-Kinney, L.K.*
Biology, Ecology, and Management of Emerging Disease Vectors—*Dobson, S.L.*
Biology, Impact, and Management of Soybean Insect Pests in Soybean Production Systems—*Obrycki, J.*
Colony Collapse in Termites: RNA Interference-mediated Genetic Manipulation—*Zhou, X.*
Comparative Ecological and Phonological Studies of Predatory Lady Beetles (Coleoptera: Coccinellidae)—*Obrycki, J.*
Defining and Utilizing Selected Molecular Features of Insect Viruses—*Webb, B.A.*
Identifying Weak Links in Bed Bug Biology—*Haynes, K.*
Inbreeding Depression in Mating Biology Following Population Bottlenecks in a Storage Pest—*Fox, C.W.*
Integrative Management Actions against Current and Potential Invasive Arthropod Pests of Field Crops in Kentucky—*Villanueva, R.*
Integrative Research on the Overwintering Biology of Insects—*Teets, N.*
Management of Pests and Conservation of Beneficial Insects in Urban Landscape—*Potter, D.*
Mechanisms of Aggression and Health Resilience in the Honey Bee *Apis mellifera*—*Rittschof, C.*
Molecular Analysis of Insecticide Resistance—*Palli, S.S.*
Quantifying the Effect of Habitat Structure on Biological Control—*Harwood, J.D.*
Research, Development, and Implementation of Mosquito Management Components in Kentucky—*Brown, G.*
Spatiotemporal Relationships in Forest-floor Food Webs—*Harwood, J.D.*
Systematics, Taxonomy, Biodiversity, and Food Web Interactions of Ichneumonidae (Insecta: Hymenoptera)—*Sharkey, M.; Chapman, E.*

Forestry

Autecology and Population Dynamics of Reintroduced Elk in a Denatured Landscape of Appalachia: Implications for Management of Kentucky's Mixed-mesophytic Forest—*Cox, J.*
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.*
Silvicultural Approaches to Enhance the Resiliency of Oak-dominated Forests to Disturbance—*Lhotka, J.*
The Oak-fire Hypothesis: Using Fire to Manage Oak Forest Ecosystems in the Central and Southern Appalachians—*Arthur, M.*
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

Defining the Role(s) of Plant Sorbitol Dyhydrogenase—*Archbold, D.*
Developing Optimized Cucurbit Systems—*Williams, M.*
Environmental and Genetic Determinants of Seed Quality and Performance (from W1168)—*Geneve, R.L.*
Evaluating Conservation Practices for Ecological Intensification of Organic High Tunnel Production Systems—*Jacobsen, K.*
Identification and Predicting LEA Protein Interacting Proteins—*Downie, A.B.*
Improving Economic and Environmental Sustainability in Tree-fruit Production through Changes in Rootstock Use—*Archbold, D.*
Introgression of Zingiberene and Type IV Trichome Density from Wild, Insect-resistant Solanum habbrochaites Accession LA2329 into Cultivated Tomato, S. l*ycopersicum*—*Snyder, J.*
Microbial Based Herbicide Discovery Focused on Cellulose Biosynthesis Inhibitors—*DeBolt, S.*
Multi-state Evaluation of Wine Grape Cultivars and Clones—*Archbold, D.*
Sustainable Practices, Economic Contributions, Consumer Behavior, and Labor Management in the U.S. Environmental Horticulture Industry—*Ingram, D.L.*

Human Environmental Sciences

Examining the Impact of In-store Marketing and Product Placement to Reduce Unhealthy Purchases Among Low-income Caregivers—*Gustafson, A.*
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.*
A Key to Unlocking the Seed Size and Number Dilemma: A New Approach to Make Bigger Seeds for Better Yield—*Kawashima, T.*
Beneficial Reuse of Residual and Reclaimed Water: Impact on Soil Ecosystem and Human Health (formerly W 2170)—*D'Angelo, E.*
Breeding and Genetics of Forage Crops to Improve Productivity, Quality, and Industrial Uses—*Phillips, T.D.*
Determining Potential Interactions of Genetics and Management in Maize—*Lee, C.*
Ecophysiology of Soybean Yield and Water Use Efficiency: Experimental and Modeling Approaches—*Salmeron Cortasa, M.*
Effects of Coatings on the Behavior of Manufactured Zinc Oxide Nanoparticles in Soil and Zinc Bioavailability to Plants—*Unrine, J.*
Effects of Fungal Endophyte Symbiosis in Tall Fescue Pasture Nutrient Dynamics and Resilience to Climate Change—*McCulley, R.*
Enhancing Wheat Breeding through Selection for Resilience to Climate Change—*Van Sanford, D.*
Evaluation of Soybean Varieties for Use in Kentucky—*Pfeiffer, T.*
Genetic Control of Pod Shattering in Soybeans—*Zhu, H.*
Genetics and Biochemistry of Phosphate Solubilization by Rhizosphere-dwelling Microbes—*Moe, L.*
Impact of Global Warming on Timing of Seedling Emergence in Summer Annuals—*Baskin, C.*
Influence of Tall Fescue Cultivar and Endophyte Genotype Combinations on Root System Architecture, Exudate Composition, and Soil Biogeochemical Processes—*McNear, D.*
Management and Environmental Factors affecting Nitrogen Cycling and Use Efficiency in Forage-based Livestock Production Systems—*Goff, B.*
Messenger RNA 3' End Formation in Plants—*Hunt, A.*
Nitrate-dependent Iron (II) Oxidation in Soils—*Matocha, C.*
Nitrifier Community Ecology Influences on Trace Gas Evolution from Agricultural Soil—*Coyne, M.*
Onsite Wastewater Treatment Systems: Assessing the Impact of Climate Variability and Climate Change—*Lee, B.*
Performance of Small Grain Varieties in Kentucky—*Van Sanford, D.*
Plant Genetic Resource Conservation and Utilization—*Phillips, T.D.*
Reduction of Tobacco-specific N-nitrosamines (TSNA) in Dark Tobaccos—*Bailey, W.A.*
Regulation of Gene Expression during Plant Embryogenesis—*Perry, S.E.*
Soil, Water, and Environmental Physics across Scales—*Wendroth, O.*
The Chemical and Physical Nature of Particulate Matter Affecting Air, Water, and Soil Quality (NCR 174)—*Karathanasis, A.*
The Cytokinin Signaling Mechanism and Plant Growth—*Smalle, J.*
Tobacco Breeding and Genetics—*Miller, R.*

Plant Pathology

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 Epichloë and and Neotyphodium Species of Fungi—*Schardl, C.L.*
Genetic and Genomic Tools to Study Associations of *Collecotrichum* Fungi with Plants—*Vaillancourt, L.*
Inhibition of *Tombusvirus* Replication by Exploiting Novel Host Factors—*Nagy, P.*
Locoweed and Its Fungal Endophyte: Impact, Ecology, and Management—*Schardl, C.*
Molecular Biology of the Interaction between Corn and Corn Stalk Rot Fungi—*Vaillancourt, L.J.*
Molecular Genetic Improvement of the Common Endophyte of Tall Fescue—*Schardl, C.L.*
Mycotoxins: Biosecurity, Food Safety, and Biofuels Byproducts (NC129, NC1025)—*Vaillancourt, L.J.*
Population Dynamics and Fitness Roles of Host Specificity Genes in the Fungus *Magnaporthe oryzae*—*Farman, M.L.*

Veterinary Science

Cellular and Molecular Basis of Equine Arteritis Virus Persistence in the Reproductive Tract of the Stallion—*Balasuriya, U.*
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—*Lyons, E.T.*
Developmental Progenitor Cells of Articular Cartilage—*Macleod, J.*
Equine Herpesvirus-1 and Equine Interferon Types 1 and 3—*Chambers, T.*
Equine Parasite Diagnostics: New Platforms for Increased Reliability—*Nielsen, M.*
Minimizing the Impact of Feral Horses on Agricultural Lands: Tuboovarian Ligation via Colpotomy as a Method for Sterilization in Mares—*Ball, B.*
National Animal Genome Research Program—*Bailey, E.*
Reference Standards, Internal Standards, and Critical Reagents/Regulatory Analytes for Analytical/Toxicological Approaches to Needs in Equine Medicine and Racing Regulation—*Tobin, T.*
Sarcocystis neurona: Investigation of Host Cell Interactions that Contribute to Parasite Survival—*Howe, D.*
The Immunological Basis for *Rhodococcus equi* Susceptibility in the Foal—*Horohov, D.W.*
The Molecular Basis for *Rhodococcus equi* Susceptibility of Foals—*Horohov, D.W.*
Vasomodulatory Effects of Endophyte Infected Tall Fescue Seed and Comparison of a KY31 Tall Fesue Pasture vs a Novel Endophyte Tall Fescue Pasture for Grazing Mares—*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, 2017–December 31, 2017) and any budgetary addition or reduction to existing projects processed within the reporting period. Grants are listed under the departments of the principal investigators.**

Agricultural Business Office

Total–$0

Evaluation of SET phases IV, V, VI, Mississippi State University, $0—*Davis, A.*

Agricultural Economics

Total–$692,833

Community Decision Making and Financial Planning for Natural and Manmade Disasters, National Institute of Food and Agriculture, $83,277—*Davis, A.*
Cultivate Kentucky Partnership Expansion, National Institute of Food and Agriculture, $80,609—*Brislen, L.*
Ecological, Livestock, Production, Cattle, Beef, Pasture, Grazing, Environment, University of Georgia, $79,064—*Halich, G.*
Evaluation of SET phases IV, V, VI, Mississippi State University, $29,773—*Davis, A.*
Governors Minority Student College Preparation Program, KY Council on Postsecondary Education, $821—*Tyler, Q.*
Investigating the Capacity of a Re-envisioned Cooperative Extension System to Build a Culture of Health, Robert Wood Johnson Foundation, $142,667—*Davis, A.*
Quantifying the Agronomic, Economic, and Environmental Benefits of Cover Crops in Mid-South Production Systems, Mississippi State University, $121,005—*Shockley, J.*
RCDI: Creating a Thriving Small Business Community in Southeast Kentucky, Rural Development, $155,617—*Davis, A.*

Agricultural Programs

Total–$216,840

Building Capacity for Watershed Leadership and Management in Twelve Mississippi River Basin States, University of Wisconsin, $34,840—*Gumbert, A.*
Kentucky AgrAbility, National Institute of Food and Agriculture, $182,000—*Palmer, G.*

Animal and Food Sciences

Total–$4,355,535

Alkaloid Toxicity Mitigation Strategies, Alltech Incorporated, $45,304—*Vanzant, E.*
DairyMaster Technology Application, DairyMaster, $84,751—*Bewley, J.*
Effect of Different Fat Sources and Vitamin E Status on Antioxident Status, Carcuss Characteristics, and Meat Quality of Pigs Grown to Heavy Slaughter Weight, Fats and Proteins Research Foundation Incorporated, $40,000—*Lindemann, M.*
Evaluating the Effects of Two Sources of Sodium (NaCl and $NaHCO_3$) on Phytase Efficacy - Mineral Metabolism and Bone Ash in 21-d-old Broiler Chickens, AB Vista, $20—*Adedokun, S.*
Evaluation of Effects of Daily BCS on Disease, Reproduction and Feed Efficiency using the DeLaval BCS System, DeLaval International AB, $50,889—*Bewley, J.*
Genomic Selection for Improved Fertility of Dairy Cows with Emphasis on Cyclicty and Pregnancy, Colorado State University, $27,542—*Amaral-Phillips, D.*
Kentucky Beef Network Master Account, KY Beef Network, $259,874—*Lehmkuhler, J.*
Mechanisms of EPNIX in Finishing Cattle, Alltech Incorporated, $58,500—*Harmon, D.*
Muscle Proteomic Approach to Characterize Biochemical Mechanisms Responsible for Woody Breast and Pale, Soft, and Exudative Conditions in Broilers, Mississippi State University, $99,000—*Suman, S.*
Nutrition and Superfund Chemical Toxicity, National Institute of Environmental Health Sciences, $2,393,534—*Hennig, B.*
One-two Punch for Organic Poultry Processing: Knocking Out Foodborne Pathogens with Plant Derived Antimicrobials and Farmer Training, Agricultural Research Service, $30,000—*Pescatore, A.*
Phibro 2017-01, Phibro Animal Health Corporation, $46,400—*Lindemann, M.*
Pilot Efficacy Study to Assess the Effect of an Endo-1,3-ß-D-Glucanase (CMG 3640) Inclusion in Corn-Soybean Meal Diets Containing Increasing Concentrations of DDGS, Elanco Animal Health, $49,000—*Lindemann, M.*
Post Doctoral Fellow—Lizza Macalintal, Alltech Incorporated, $360,000—*Pescatore, A.*
Real Time Location System for Monitoring Dairy Cattle Behavior, Smartbow GmBH, $149,336—*Bewley, J.*
Real Time Location System for Monitoring Dairy Cattle Behavior, Smartbow GmBH, $42—*Costa, J.*
Service Agreement Antihemelitic Screening, Alltech Incorporated, $98,000—*Pescatore, A.*
Southeast Quality Milk Initiative: Implementing Science Based Recommendations in the Field, University of Tennessee, $67,730—*Amaral-Phillips, D.*
Southeast Quality Milk Initiative: Implementing Science-based Recommendations to Control Mastitis and Improve Milk Quality in the Southeast, University of Tennessee, $79,136—*Coffey, R.*
Student Sponsorship—Lauren Wood Nolan, Alltech Incorporated, $37,800—*Pescatore, A.*
Student Sponsorship—Yemi Olojede, Alltech Incorporated, $40,872—*Adedokun, S.*
Student Support Agreement—Amanda Pesqueira, Alltech Incorporated, $45,573—*Harmon, D.*
Student Support Agreement—Gustavo Mazon, Alltech Incorporated, $34,704—*Bewley, J.*
The Alltech-UK Animal Nutrigenomics Alliance, Alltech Incorporated, $162,650—*Matthews, J.*
Use of In Vitro Fermentation as a Comparative Measure of Ionophore Function, Zoetis LLC, $95,002—*Harmon, D.*

Biosystems and Ag Engineering

Total–$1,824,196

Alliance for Food Security through Reduction of Postharvest Loss and Food Waste, Oklahoma State University, $20,654—*McNeill, S.*
AMPLIFIES Ghana: Assisting Management in the Poultry and Layer Industries by Feed Improvement and Efficiency Strategies in Ghana, Oklahoma State University, $184—*McNeill, S.*
Edge of Field Modeling to Address Nutrient Management in Tile-drained Agricultural Landscapes, US Department of Agriculture, $120,201—*Ford, W.*
Improving the Accuracy of Chemical Applications with Direct Injection, National Institute of Food and Agriculture, $498,726—*Stombaugh, T.*
KSEF RDE: A Sweet BioAg Solution: Sweet Sorghum Bagasse Based Crop Yield Enhancer, KY Science and Technology Co Inc, $50,000—*Shi, J.*
LP Hybrid Forklift Demonstration, Propane Education and Research Council, $97,527—*Dvorak, J.*
Next-generation Spray Drift Mitigation via Field-deployable, Real-time Weather Monitoring and Novel Spray Nozzle Control Technologies, University of Nebraska, $54,070—*Sama, M.*
Nigeria Capacity Building on Stored Commodities, Foreign Agricultural Service, $10,477—*McNeill, S.*
RII Track-2 FEC: Assembling Successful Structures: Lignin Beads for Sustainability of Food, Energy, and Water Systems, Louisiana State University, $725,000—*Nokes, S.*
Support of the French Tobacco Sector in Utilization of a Recently Developed High Capacity Market Preparation System for Air-cured Burley Tobacco, Arvalis Institut du Vegetal, $20—*Wells, L.*
Sustainable Aquaculture: Education, Research and Outreach for Small Farms, KY State University, $121,107—*Dvorak, J.*
Technical Assistance for Energy Use on Kentucky Farms, Rural Development, $76,270—*McNeill, S.*
UK Cooperative Extension Energy Education Program, KY Energy and Environment Cabinet, $50,000—*Fehr, R.*

Community and Leadership Development

Total–$1,026,067

Building Capacity and Diffusing Innovation in Community Development Education, National Institute of Food and Agriculture, $731,296—*Hains, B.*
Establishing a Family and Consumer Sciences Degree, KY State University, $11,771—*Jones, K.*
Strong Dads, Resilient Families, National Institute of Food and Agriculture, $140,000—*Jones, K.*
The YMCA, UK, and KSU: YES (Youth Engagements and Support), National Institute of Food and Agriculture, $140,000—*Jones, K.*
University of Kentucky Perkins Leadership Award 2017-2018, KY Department of Education, $3,000—*Vincent, S.*

Dietetics and Human Nutrition

Total–$182,865

Higher Education Challenge Grant Obesity Food Insecurity Paradox, National Institute of Food and Agriculture, $139,604—*Gustafson, A.*
Plate It Up! Kentucky Proud: Recipe Development and Evaluation Based on 2015-2020 Dietary Guidelines for Americans, KY Department of Agriculture, $43,261—*Stephenson, T.*

Entomology

Total–$2,495,398

Assessing Bee Attractiveness of Woody Landscape Plants and Mitigating Potential Bee Hazard from Neonicotinoid Insecticides, Rutgers University, $187,669—*Potter, D.*
Assessing Bee Attractiveness of Woody Landscape Plants and Mitigating Potential Bee Hazard from Neonicotinoid Insecticides, Horticultural Research Institute, $26,000—*Potter, D.*
Cooperative Agricultural Pest Surveys (CAPS) in Kentucky, Animal and Plant Health Inspection Service, $58,370—*Lensing, J.*
Development of Artificial Blood for Mosquitoes, Bill and Melinda Gates Foundation, $61—*Dobson, S.*
Development of Novel Insecticide Synergistic for Resistance Management, Agricultural Research Service, $92,000—*Palli, S.*
Development of RNAi-based Control Technologies for Use in Plant Health Emergencies, Animal and Plant Health Inspection Service, $91,999—*Palli, S.*
Do Bacterial Symbionts Play a Role in Insecticide Resistance in a Polyphagous Aphid Pest?, Iowa State University, $150,000—*White, J.*
Epigenetic and Posttranslational Modifier Regulation of Juvenile Hormone Action, National Institute of General Medical Sciences, $252,000—*Palli, S.*
Evaluating Aphis Resistance to Pyrethroids in Western Kentucky's Wheat, KY Small Grain Growers Association, $4,738—*Villanueva, R.*
Forest Pest Outreach and Education, Animal and Plant Health Inspection Service, $8,768—*Lensing, J.*
FY 2017-2018 UK Private Pesticide Applicator, KY Department of Agriculture, $27,500—*Townsend, L.*
FY 2017-2018 UK Private Pesticide Applicator, KY Department of Agriculture, $27,500—*Townsend, L.*
Grape Commodity Survey, Animal and Plant Health Inspection Service, $21,000—*Lensing, J.*
Healthy Trees - Healthy People, Animal and Plant Health Inspection Service, $34,396—*Rieske-Kinney, L.*
Impact of Genotype and Environmental Variables on Transgene Effectiveness for Conditional Lethality Systems in Insects, National Institute of Food and Agriculture, $500,000—*Teets, N.*
Imported Fire Ant Survey, Animal and Plant Health Inspection Service, $3,783—*Lensing, J.*
Kentucky Extension IPM Implementation Program: 2017-2020, National Institute of Food and Agriculture, $128,889—*Bessin, R.*
KY FY17 Apple Survey Farm Bill Project 1, Animal and Plant Health Inspection Service, $17,000—*Lensing, J.*
KY FY17 Gypsy Moth, Animal and Plant Health Inspection Service, $252,600—*Lensing, J.*
Management of Brown Marmorated Stink Bug in US Specialty Crops, North Carolina State University, $57,969—*Bessin, R.*
Management of Stink Bugs in Soybeans: Does One Strategy Fit All Species?, KY Soybean Promotion Board, $41,693—*Villanueva, R.*
Managing Wild Birds for Improved Strawberry Production, Pest Control, and Food Safety Outcomes in the California Central Coast, University of California Davis, $32,274—*Gonthier, D.*
Monitor Gypsy Moth Populations for Slow the Spread Program, Slow the Spread Foundation, $44,000—*Harper, C.*
Phytophthora ramorum Survey, Animal and Plant Health Inspection Service, $20,000—*Lensing, J.*
Pine Shoot Beetle Survey, Animal and Plant Health Inspection Service, $11,290—*Lensing, J.*
RNAi Methods for Zika Virus Vector Control, National Institute of Allergy and Infectious Diseases, $210,000—*Palli, S.*
Sublethal Effects of Neurotoxic Insecticides on Insect Behavior, Iowa State University, $140,000—*Haynes, K.*
Thousand Cankers Disease/Walnut Twig Beetle Survey, Animal and Plant Health Inspection Service, $25,000—*Lensing, J.*
Times Insecticide Spray to Conrol Aphids and Reduce BYDV Infections, KY Small Grain Growers Association, $15,149—*Villanueva, R.*
Wire Evaluation in Sweet Potato and IR-4 State Liason, University of Florida, $13,750—*Bessin, R.*

Family and Consumer Sciences

Total– $11,274,224

2016 MTAC Grant, Purdue University, $109,505—*Ashurst, K.*
Collaborative Environment Approaches to Reduce Obesity Disparities in Kentucky, Center for Disease Control and Prevention, $786,256—*Vail, A.*
DOD/USDA Extension Military Partnership Overall Leadership, Purdue University, $42,953—*Ashurst, K.*
UK SNAP Ed Program 2018, KY Department of Community Based Services, $10,335,510—*Vail, A.*

Family Studies

Total–$142,570

Keys to Embracing Aging Program Expansion, Kansas State University, $142,570—*Kostelic, A.*

Forestry

Total–$417,581

Demographic and Genetic Status of a Reintroduced River Otter Population in North-central New Mexico, New Mexico Department of Fish and Game, $24,432—*Cox, J.*
Evaluating Chemical Fingerprinting as a Tool to Rapidly Screen Hybrid Chestnut for Disease Resistance, American Chestnut Foundation, $4,511—*Stringer, J.*
Forest Health and Research Education Center, Forest Service, $50,000—*Stringer, J.*
Increasing Farm Bill Participation and Benefits, Natural Resources Conservation Service, $61,100—*Thomas, W.*
Oak Genetic Improvement Program, KY Energy and Environment Cabinet, $200,000—*Crocker, E.*
Occupancy and Abundance of the Streamside Salamander (*Ambystoma barbouri*) in Relation to Land-use, Water Chemistry, and Flow Rate in Central Kentucky Streams, KY Department of Fish and Wildlife, $31,080—*Price, S.*

Quantifying White-tailed Deer Damage to Corn Yields in Kentucky, KY Corn Growers Association, $12,443—*Springer, M.*
Quantifying White-tailed Deer Damage to Soybean Yields in Kentucky, KY Soybean Promotion Board, $13,647—*Springer, M.*
Restoring Headwater Streams and Riparian Corridors at the Savannah River Site, SC: Part B- Restoration Proposal and Permit Application, Forest Service, $16,848—*Barton, C.*
Using Forest Health Assessment as a Tool for Citizen Engagement and Education, Lexington Fayette Urban County Government, $3,520—*Crocker, E.*

Horticulture

Total–$1,183,216

A Multi-regional Approach for Sustained Soil Health in Organic High Tunnels: Nutrient Management, Economics, and Educational Programming, University of Minnesota, $174,991—*Jacobsen, K.*
Center for Crop Diversification Production and Marketing Resources for Kentucky Specialty Crop Growers, KY Department of Agriculture, $49,999—*Cassady, C.*
Clean WateR3 - Reduce, Remediate, Recycle: Informed Decision-making to Facilitate Use of Alternative Water Resources and Promote SustainableSpecialty Crop Production, Clemson University, $130,187—*Ingram, D.*
Developing a Modified Hydroponic Stock Plant System for Minicuttings of Difficult-to-Root Nursery Crops, Horticultural Research Institute, $18,000—*Geneve, R.*
Hops for Kentucky, KY Department of Agriculture, $39,811—*Wright, S.*
KY Hort Council Grants VIII, KY Horticulture Council, $510,600—*Ingram, D.*
No P in my Lawn, Lexington Fayette Urban County Government, $35,000—*Durham, R.*
UK Viticulture and Enology Research and Extension, KY Governor's Office of Agricultural Policy, $210,628—*Wilson, P.*
UK-Wine Seminars, KY Department of Agriculture, $14,000—*Wilson, P.*

Kentucky Small Business Development Center

Total–$1,764,069

Kentucky Small Business Development Center, Small Business Administration, $1,339,142—*Davis, A.*
Kentucky Small Business Development Center, Small Business Administration, $294,074—*Davis, A.*
Kentucky Small Business Development Center Lease, Commerce Lexington Inc, $13,500—*Davis, A.*
Louisville SBDC Local Support, Louisville Metro Government, $30,000—*Davis, A.*
OnGoing SBDC PROGRAM INCOME ACCOUNT, Small Business Administration, $12,647—*Davis, A.*
Portable Assistance Program, Small Business Administration, $100,000—*Davis, A.*

Kentucky Tobacco Research and Development Center

Total–$3,694,197

BAT JKTobacco1, British American Tobacco, $154,000—*Kurepa, J.*
BAT SPTobacco1, British American Tobacco, $485,744—*Pattanaik, S.*
Development and Distribution of a Certified Reference Cigarette Suitable for Research Applications and Establishing a Proficiency Testing Program at the University of Kentucky Reference Cigarette Program, Food and Drug Administration, $598,868—*Chambers, O.*
NNK Research, Altria Corporate Services Inc, $77,000—*Ji, H.*
RJRTARUKY-1, RJ Reynolds Tobacco Co, $48,970—*Zaitlin, D.*
RJRTARUKY-2-SP&LY, RJ Reynolds Tobacco Co, $123,816—*Pattanaik, S.*
RJRTARUKY-3-SP&LY, RJ Reynolds Tobacco Co, $206,106—*Pattanaik, S.*
Smokeless Tobacco Reference Product Development, Distribution and Research, Food and Drug Administration, $1,999,693—*Chambers, O.*

Merchandising, Apparel and Textiles

Total–$23,926

Quality Control Lab for NAILM, Association for Linen Management, $23,926—*Easter, E.*

Plant and Soil Sciences

Total–$4,826,569

2017 Burley Tobacco Trials, Altria Corporate Services Inc, $28,000—*Pearce, R.*
Accelerating the Development of FHB-resistant Soft Red Winter Wheat Varieties, Agricultural Research Service, $66,875—*Van Sanford, D.*
BAT SYTobacco1, British American Tobacco, $370,162—*Yang, S.*
Bayer Soybean, Bayer CropScience GmbH, $6,000—*Carter, S.*
Blue Water Farms: Edge-of-Field Monitoring in Kentucky Soils, KY Soybean Promotion Board, $206,184—*Lee, B.*
Breeding New Cover Crop Rye Cultivars for the Midwest, KY Small Grain Growers Association, $3,000—*Phillips, T.*
Burley Tobacco Breeding and Genetics, Philip Morris International Management SA, $325,000—*Miller, R.*
Can Fusarium Head Blight Vomitoxin Levels be Reduced with Agronomic Practices?, KY Small Grain Growers Association, $44,112—*Knott, C.*
Chia Improvement through Plant Breeding and Seed Production, KY Specialty Grains LLC, $5,500—*Hildebrand, D.*
Comparing the Xtend Soybean System to the Roundup Ready System, KY Soybean Promotion Board, $17,435—*Lee, C.*
Comprehensive Soybean Guide Publication Cost, KY Soybean Promotion Board, $11,250—*Knott, C.*
DAS NA17T8G001, Dow AgroSciences, $3,000—*Cropper, K.*
Detection and Management of Herbicide-resistant Annual Ryegrass in Kentucky Wheat, KY Small Grain Growers Association, $10,033—*Legleiter, T.*
Developing Irrigation Management Strategies for Soybean Production in Humid Regions of the Southern US, Southern Soybean Research Program, $50,000—*Wendroth, O.*
Development of High #3 Soybeans, United Soybean Board, $49,223—*Hildebrand, D.*
Do Critical Soil Phosphorus Concentrations Vary in Space and if so Why?, Foundation for Agronomic Research, $70,000—*McGrath, J.*
DOW Chemical Materials Trial, Dow AgroSciences, $11,466—*Kenimer, R.*
EAGER: Environmental Fate of Double Stranded RNA-based Bionanocomposites., National Science Foundation, $149,945—*Unrine, J.*
Ecophysiology of Corn Yield Potential and N Requirements under Variable Water Management, KY Corn Growers Association, $34,457—*Salmeron Cortasa, M.*
Enhanced Chia Production and Product Usage, KY Small Grain Growers Association, $27,110—*Hildebrand, D.*
Fragipan Remediation, KY Small Grain Growers Association, $17,000—*Murdock, L.*
Fragipan Remediation - Corn, KY Corn Growers Association, $17,000—*Murdock, L.*
Improving Colloidal Stability of Nanoparticle Delivery Systems, Syngenta Crop Protection, $244,142—*Unrine, J.*
Integrated Management Techniques to Combat Potential Shifts in Horseweed Emergence, National Institute of Food and Agriculture, $324,992—*Haramoto, E.*
Integrating Cover Crops and Herbicides for Marestail Managment Prior to Soybean, KY Soybean Promotion Board, $9,764—*Haramoto, E.*
Intensive Management: An Option to Increase Double-crop Soybean Yields?, KY Soybean Promotion Board, $51,424—*Knott, C.*
Investigation of Multiple Herbicide Resistant Palmer Amaranth and Waterhemp, KY Soybean Promotion Board, $27,419—*Green, J.*
Mechanisms of Gene Regulation by the Plant MADS-domain Transcription Factor AGL15 and Developmental Outcomes, National Science Foundation, $206,491—*Perry, S.*
Monsanto SO 28, Monsanto Co, $14,560—*Slack, C.*
Monsanto SO 30, Monsanto Co, $21,000—*Slack, C.*
Monsanto SO 31, Monsanto Co, $7,350—*Lee, C.*
Nutrient and Sediment Runoff Assessment in the Upper Mississippi River Embayment, Natural Resources Conservation Service, $904,300—*Lee, B.*
Optimization of Cyclopropanation of Renewable Oils with Novel Functionality, Valvoline LLC, $42,000—*Hildebrand, D.*
Optimizing Cropping Systems for Resilience to Stress: Role of Maturity Group Selection and Cover Crops on Yield, Weeds, Insects, and Microbes, University of Nebraska, $110,640—*Haramoto, E.*
Optimizing the Integration of Annual Forages into Tobacco Systems, Council for Burley Tobacco, $19,862—*Goff, B.*
Optimizing Winter Cover Crops for Weed Management in Soybeans RENEWAL, KY Soybean Promotion Board, $39,993—*Haramoto, E.*
Performance of Small Grain Varieties in Kentucky, KY Small Grain Growers Association, $12,133—*Bruening, W.*
Quantifying the Potential of 100 bu ac-1 Yield Soybean and Its Profitability for Environmental Conditions in Kentucky, KY Soybean Promotion Board, $34,888—*Salmeron Cortasa, M.*
Renewal-Center for the Environmental Implications of Nanotechnology, Duke University, $137,999—*Unrine, J.*
SO 2017-01-B3-02, Monsanto Co, $11,200—*Lee, C.*
Soft Red Winter Wheat Breeding and Variety Development for Kentucky, KY Small Grain Growers Association, $66,625—*Van Sanford, D.*
Soil Health Benefit from Winter Wheat in the Rotation, KY Small Grain Growers Association, $10,000—*Grove, J.*
Soil Morphology Course 2016-2018, KY Department for Public Health, $20,000—*Pfeiffer, T.*

Support for Technician Position with the Kentucky Soybean Variety Performance Program - Fiscal Year 2018, KY Soybean Promotion Board, $50,530—*Venard, C.*
Syngenta Soybean Appendix A-2, Syngenta Crop Protection, $13,000—*Slack, C.*
Topping Height of High Leaf Number Potential Varieties, Council for Burley Tobacco, $9,500—*Fisher, C.*
U.S. Wheat and Barley Scab Initiative's Networking and Facilitation Office and Website, Agricultural Research Service, $263,758—*Van Sanford, D.*
Understanding the Components and Mechanisms Responsible for High Yielding Soybeans, KY Soybean Promotion Board, $34,548—*Ritchey, E.*
Updating Rye and Barley Management Guidelines for Kentucky, KY Small Grain Growers Association, $18,000—*Lee, C.*
USB Herbicide Resistant Crops and Weeds-Year 2, Purdue University, $27,997—*Green, J.*
Using Precision Technology in On-farm Field Trials to Enable Data Intensive Fertilizer, University of Illinois, $29,702—*McGrath, J.*
Utilizing Grass-Endophyte Technology to Improve Pasture Soil Health and Resilience to Climate Change Stressors, National Institute of Food and Agriculture, $500,000—*McCulley, R.*
Vertical Tillage or No-tillage for Soft Red Winter Wheat, KY Small Grain Growers Association, $10,000—*Ritchey, E.*
Wheat Field Schools at UK WREC in Princeton, KY, KY Small Grain Growers Association, $30,000—*Ritchey, E.*

Plant Pathology

Total–$1,733,102

Applied Management of Fusarium Head Blight in Kentucky, Agricultural Research Service, $20,289—*Bradley, C.*
Can Diversifying Orchards Lead to Higher Disease Losses?, KY Department of Agriculture, $28,755—*Gauthier, N.*
Characterization of the Sf9-rhabdovirus in Plants, Takeda Pharmaceuticals North America Inc, $63,030—*Goodin, M.*
Developing a Comprehensive Management Program for Foliar Diseases of Soybean, Southern Illinois University, $126,671—*Bradley, C.*
Dynamics of Genetic Mutations Conferring AzoxystrobinResistance in Two Populations of the Frogeye Leaf Spot Pathogen, *Cercospora nicotianae*, under Different Spray Schedules, Council for Burley Tobacco, $11,000—*Pfeufer, E.*
Examining the Importance of Dynamic Trafficking in Systemic Acquired Resistance, National Science Foundation, $12,000—*Kachroo, A.*
Exploiting Potential Bio-control Agents to Manage Seedling Diseases of Soybean (Year 3), Southern Illinois University, $30,666—*Bradley, C.*
Improving Fungicide Application Recommendations for Managing Fusarium Head Blight of Wheat and Barley, KY Small Grain Growers Association, $16,135—*Bradley, C.*
Independent and Plant-mediated Inhibition of Plant Pathogens in Tomato by Fermentation Byproduct Research, Alltech Incorporated, $32,088—*Pfeufer, E.*
Integrated Management Strategies for Aspergillus and Fusarium Ear Rots of Corn, Purdue University, $84,098—*Wise, K.*
iPIPE: Corn Component, North Carolina State University, $38,872—*Bradley, C.*
KSEF RDE: Pipecolic Acid-mediated Defense Signaling in Plants, KY Science and Technology Co Inc, $49,996—*Kachroo, P.*
Managing Frogeye Leaf Spot of Soybean with Foliar Fungicides and Resistant Varieties, KY Soybean Promotion Board, $22,750—*Bradley, C.*
Race Survey of *Phytophthora sojae*, Causal Agent of Phytophthora Root Rot of Soybean in Kentucky, KY Soybean Promotion Board, $9,950—*Bradley, C.*
Research Coordination, United Soybean Board, $5,000—*Bradley, C.*
Southern Plant Diagnostic Network, Kentucky Component, University of Florida, $45,000—*Vincelli, P.*
Southern Region SARE Sustainable Agriculture Training Program—Professional Development Program—Assistant, University of Georgia, $44,444—*Vincelli, P.*
Student Sponsorship—Erica Fealko: Independent and Plant-mediated Inhibition of Plant Pathogensin Tomato by Fermentation Byproduct, Alltech Incorporated, $35,143—*Pfeufer, E.*
Syngenta Field Testing Project, Syngenta Crop Protection, $29,400—*Bradley, C.*
Telomere Roles in Fungal Genome Evolution and Adaptation, National Science Foundation, $724,625—*Farman, M.*
The Cellular Actin Network and Virus Replication, National Science Foundation, $190,000—*Nagy, P.*
Transgenic Approaches in Managing Sudden Death Syndrome, Iowa State University, $40,600—*Bradley, C.*
Use of Plant Growth-promoting Microbes for Improved Soybean Yield and Stress Tolerance, KY Soybean Promotion Board, $49,070—*Kachroo, P.*
Valent U.S.A. Corporation - Field Testing Project, Valent USA LLC, $23,520—*Bradley, C.*

Regulatory Services

Total–$648,635

BSE Rule and Medicated Feed Inspections, Food and Drug Administration, $1—*Harrison, G.*
Feed Manufacturing Inspections, Food and Drug Administration, $48,634—*Harrison, G.*
Implementation of the Animal Feed Regulatory Program Standards in Kentucky, Food and Drug Administration, $600,000—*Johnson, D.*

Research

Total–$1,043,305

2016-17 Acquisition of Goods and Services for the USDA Offices in Ag North, Agricultural Research Service, $34,199—*Bennett, A.*
2017-18 Acquisition of Goods and Services for the USDA Offices in Ag North, Agricultural Research Service, $10,010—*Bennett, A.*
Equine Medical Director 2017-18, KY Horse Racing Commission, $189,755—*Oliver, L.*
FAPRU SCA, Agricultural Research Service, $809,341—*Bennett, A.*

Tracy Farmer Center for Sustainability and the Environment

Total–$150,418

Exploring Water Quality in Kolkata and Kentucky, Department of State, $150,418—*Hanley, C.*

UK Veterinary Diagnostic Lab

Total–$643,593

Bovine Spongiform Encephalopathy (BSE) Surveillance Testing in Mature Cattle, KY Department of Agriculture, $11,600—*Carter, C.*
Case-based Distance Learning for Food Animal Veterinarians, National Institute of Food and Agriculture, $250,000—*Arnold, L.*
FDA Vet-LIRN Veterinary Diagnostic Laboratory Cooperative Agreement Program Funding to Increase Sample Analysis in the Event of Animal Food or Drug Related Illness, Food and Drug Administration, $26,300—*Gaskill, C.*
KY NAHLN FY 17 Level 2 Member Lab Agreement, Animal and Plant Health Inspection Service, $120,693—*Carter, C.*
Mosquito and Tick Testing FY17, KY Department for Public Health, $107,500—*Carter, C.*
Mosquito and Tick Testing FY18, KY Department for Public Health, $13,500—*Carter, C.*
Surveillance of Avian Influenza and Mycoplasma by PCR Methods, and Necropsy Submissions, KY Department of Agriculture, $15,000—*Carter, C.*
Validation Of LC-MS/MS Analysis of Animal Tissue and Feed Matrices for Toxicants, Food and Drug Administration, $99,000—*Gaskill, C.*

Veterinary Science

Total–$713,983

Anthelmintic Efficacy of Novel Compounds Against Equine Strongyles: A Proof of Principle Study, Merial Ltd, $40,059—*Nielsen, M.*
Caught in the Act: Visualizing the Architecture of Bacterial Type IV Secretion System Machinery at the Cell-Cell Interface, Burroughs Wellcome Fund, $10,000—*Shaffer, C.*
Combination Anthelmintic Therapy: Short and Long Term Benefits, Zoetis LLC, $25,680—*Nielsen, M.*
Effects of Pergolide Treatment on Metabolic and Immunological Function in Horses with Pituitary Pars Intermedia Dysfunction (PPID), Boehringer Ingelheim Vetmedica, $79,731—*Adams, A.*
Engineered Probiotics for Farm Animal and Human Nematodes, University of Massachusetts, $57,868—*Nielsen, M.*
Identification of Genetic Factors Responsible for Establishment of Equine Arteritis Virus Carrier State in Stallions., National Institute of Food and Agriculture, $484,934—*Balasuriya, U.*
MicroRNAs as Markers of Placental Health in the Mare, Grayson Jockey Club Research Foundation Inc, $15,000—*Loux, S.*
Smartphone Egg Count Validation Study, Zoetis LLC, $711—*Nielsen, M.*

Multidisciplinary Grants Led by Other Colleges*

Total– $142,570

Keys to Embracing Aging Expansion, Kansas State University, $142,570—*Kostelic, A.*

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

Intellectual Property

GenBank Register

Animal and Food Sciences

Matthews, J.C. Hepatic gene expression profiles of growing versus finishing beef steers, 16 microarrays. Accession GSE107881.

Entomology

Athey K.J., S.A. Clutts-Stoelb, E.G. Chapman, and M.J. Sharkey. Cytochrome c oxidase subunit I (COI) gene, partial cds; mitochondrial. Accessions:

- KY020352–KY020399 (48 sequences)
- KY034141-KY034257 (117 sequences: 28S ribosomal RNA gene, partial sequences)
- MF361678-MF361714 (37 sequences: 28S ribosomal RNA gene, partial sequences)
- MF098306-MF098390 (85 sequences: cytochrome c oxidase subunit I [COI] gene, partial cds; mitochondrial)

Kalsi, M., and S.R. Palli. RNA seq data from Tribolium adults with and without CncC expression. Accession PRJNA383146.

Roy, A., and S.R. Palli. Illumina HiSeq4000 sequence data multiple functions of CREB-binding protein during post embryonic development. PRJNA383401 and SRP104247; samples, SRS2131977-SRS2131984; experiment, SRX2745604-SRX2745604-SRX2745610 and run, SRR5457553-SRR5457559.

Plant Pathology

Bradley, C.A. *Cercospora sojina* S9, whole genome shotgun sequencing project. Accession AHPQ00000000.1.

Farman, M.L. *Magnaporthe oryzae* strain 87-120, whole genome shotgun sequencing project. Accession PQBK00000000.1.

Farman, M.L. *Pyricularia pennisetigena* strain PM1, whole genome shotgun sequencing project. Accession PQBJ00000000.1.

Farman, M.L. *Magnaporthe oryzae* strain WHTQ, whole genome shotgun sequencing project. Accession PJXP00000000.1.

Farman, M.L. *Magnaporthe oryzae* strain WBKY11, whole genome shotgun sequencing project. Accession PJXR00000000.1.

Farman, M.L. *Magnaporthe grisea* strain VO107, whole genome shotgun sequencing project. Accession PJXS00000000.1.

Pfeufer, E.E. *Hyaloperonospora parasitica* rDNA ITS. Accession KX231682.1.

Schardl, C.L. Swainsonine biosynthesis gene cluster protein A. Accession E9F8L8.2.

Schardl, C.L. Swainsonine biosynthesis gene cluster protein K. Accession D4AU31.1 GI:1239396339.

Schardl, C.L. Swainsonine biosynthesis gene cluster protein K. Accession E9F8M3.1 GI:1239396319.

Schardl, C.L. Swainsonine biosynthesis gene cluster protein A. Accession D4AU29.1 GI:1239396297.

Schardl, C.L. Ergot alkaloid synthesis protein E; Flags: Precursor. Accession A2TBU3.1.

Vaillancourt, L.J. *Colletotrichum graminicola* strain M5.001, whole genome shotgun sequencing. Accession MRBI00000000.1.

Vaillancourt, L.J. *Colletotrichum sublineola* strain CgSl1, whole genome shotgun sequencing. Accession MQVQ00000000.1.

Vaillancourt, L.J. *Colletotrichum fioriniae* isolate HC557 glyceraldehyde-3-phosphate dehydrogenase (GAPDH) gene, partial cds. Accession KX161774.1.

Vaillancourt, L.J. *Colletotrichum fioriniae* isolate HC557 beta-tubulin (TUB2) gene, partial cds. Accession KX161773.1.

Vaillancourt, L.J. *Colletotrichum graminicola* strain M30.001 rDNA ITS. Accession KY006075.1.

M.L. Farman had 42 additional accessions.

C.L. Schardl had 88 additional accessions.

L.J. Vaillancourt had 6 additional accessions.

Veterinary Science

Carossino, M., P. Dini, T.S. Kalbfleisch, A.T. Loynachan, I.F. Canisso, K.M. Shuck, P.J. Timoney, R.F. Cook, and U.B.R. Balasuriya. Downregulation of eca-mir-128 in seminal exosomes and enhanced expression of CXCL16 in the stallion reproductive tract are associated with long-term persistence of equine arteritis virus. Accession GSM2891902-GSM2891909.

Nam, B., Z. Mekuria, M. Carossino, G. Li, Y. Zheng, J. Zhang, R.F. Cook, J.R. Campos, K.M. Shuck, E.L. Squires, M.H.T. Troedsson, E. Bailey, P.J. Timoney, and U.B.R. Balasuriya. Equine arteritis virus intra-host evolution and viral population dynamics during acute and long-term persistent infection. Accession MG137429 to MG137481.

Sarkar, S., E. Bailey, Y.Y. Go, R.F. Cook, T. Kalbfleisch, J. Eberth, R.L. Chelvarajan, K.M. Shuck, S. Artiushin, S., P.J. Timoney, and U.B.R. Balasuriya. Allelic variation in cxcl16 determines CD3+ T lymphocyte susceptibility to equine arteritis virus infection and establishment of long-term carrier state in the stallion. Animal samples from *Equus caballus.* Accession SAMN03838869/SRX1097022, SAMN03838867/SRX1097495 and SAMN03838868/SRX1097492.

Gene Expression Omnibus

Matthews, J.C. Hepatic gene expression profiles of growing versus finishing beef steers, 16 microarrays. Accession GSE107881.

Publications

Annual Report

One Hundred and Thirtieth Annual Report of the Kentucky Agricultural Experiment Station for 2017. College of Agriculture, Food and Environment, University of Kentucky, Rick Bennett, Director.

Books and Book Chapters

Agricultural Economics

Dillon, C., J. Shockley, and T.B. Mark. The sensitivity of economic gains from high-speed planting. IN: J.A. Taylor, D. Cammarano, A. Prashar, and A. Hamilton, eds. *Precision Agriculture '17: 11th European Conference on Precision Agriculture*. Cambridge University Press.

Griffin, T.W., J.M. Shockley, and T.B. Mark. Economics of precision agriculture. *Precision Agricultural Basics*. American Society of Agronomy.

Hu, W. Using market-based tools to protect and improve water quality in Kentucky. IN: B.D. Lee, A. Jones, D. Carey, and J. Burch, eds. *Shaped by Water: Kentucky's Watersheds, Landscapes, and People*. University Press of Kentucky, Lexington.

Martin, B., C. Dillon, T.B. Mark, and T. Davis. A whole farm analysis of the implications of variable maturity groups on harvest logistics and net returns. IN: J.A. Taylor, D. Cammarano, A. Prashar, and A. Hamilton, eds. *Precision Agriculture '17: 11th European Conference on Precision Agriculture*. Cambridge University Press.

McDonald, C., D. Freshwater, and C. Allegri. *Territorial Policy Reviews: Northern Sparsely Populated Areas*. OECD Publishing, Paris.

Rossi, J.J. A political economy of molecular futures. *The Routledge Handbook of the Political Economy of Science*. New York: Routledge.

Shockley, J., T.B. Mark, and C. Dillon. Educating producers on the profitability of precision agriculture technologies. IN: J.A. Taylor, D. Cammarano, A. Prashar, and A. Hamilton, eds. *Precision Agriculture '17: 11th European Conference on Precision Agriculture*. Cambridge University Press.

Animal and Food Sciences

Faustman, C., and S.P. Suman. The eating quality of meat: I–Color. Chapter 11, pp 329–356. IN: F. Toldra, ed. *Lawrie's Meat Science* 8th ed. Elsevier, Oxford, United Kingdom.

Hennig, B., M.C. Petriello, B.J. Newsome, J.T. Perkins, and D. Liu. Antioxidant therapy against environmental pollutants and associated diseases: Nutritional antioxidant intervention against environmental pollution. Chapter 3, part 4. IN: Kaïs Hussain Al-Gubory and Ismail Laher, eds. *Nutritional Antioxidant Therapies: Treatments and Perspectives.* Springer-Verlag, Germany.

Jacob, J.P., and A.J. Pescatore. Assessing the sustainability of organic egg production. Chapter 31. IN: J. Roberts, ed. *Achieving Sustainable Cultivation of Eggs*. Burleigh Dodds Science Publishing Ltd.

Nair, M.N., B.R.C. Costa-Lima, M.W. Schilling, and S.P. Suman. Proteomics of color in fresh muscle foods. Chapter 10, pp 163–175. IN: M. Colgrave, ed. *Proteomics in Food Science: From Farm to Fork*. Elsevier, Oxford, United Kingdom.

Suman, S.P., and M.N. Nair. Current developments in fundamental and applied aspects of meat color. Chapter 6, pp 115–127. IN: P.P. Purslow, ed. *New Aspects of Meat Quality: From Genes to Ethics*. Elsevier, Oxford, United Kingdom.

Biosystems and Agricultural Engineering

Zheng, Y., J. Shi, M. Tu, and Y.-S. Cheng. Principles and development of lignocellulosic biomass pretreatment for biofuels. Pp. 1–68. IN: *Advances in Bioenergy,* vol. 2. Elsevier, Oxford, United Kingdom.

Community and Leadership Development

Breazeale, N., and R.J. Hustedde. Understanding the impact of culture on entrepreneurship. IN: Michael Fortunato and Morgan R. Clevenger, eds. *Entrepreneurial Community Development: Leaping Cultural and Leadership Boundaries.* Taylor and Francis/Routledge.

Entomology

Potter, M.F. 2016. Bed bugs through history. Pp. 1–16. IN: S.L. Doggett, D.M. Miller, and C.Y. Lee, eds. *Advances in the Biology and Management of Modern Bed Bugs.* Wiley Blackwell.

Family Sciences

Gale, J., and D.B. Ross. Relational financial therapy. Pp. 1–4. IN: J. Lebow, A. Chambers, and D.C. Breunlin, eds. *Encyclopedia of Couple and Family Therapy.* Springer, Cham. Published online: doi:10.1007/978-3-319-15877-8_962-1.

Forestry

Barton, C. Forward. Pp. 124–145. IN: N. Bolan, M.B. Kirkham, and Y.S. Ok, eds. *Spoil to Soil: Mine Site Rehabilitation and Revegetation.* Taylor and Francis.

Barton, C., E. Witt, and J. Stringer. Protecting water resources with streamside management zones at Robinson Forest. Pp. 81–87. IN: B.D. Lee, D.I. Carey, and A.L. Jones, eds. *Water in Kentucky: Natural History, Communities, and Conservation.* University of Kentucky Press, Lexington.

Barton, C., K. Sena, T. Dolan, P. Angel, and C. Zipper. Restoring forests on surface coal mines in Appalachia: A regional reforestation approach with global application. Chapter 8, pp. 124–145. IN: N. Bolan, M.B. Kirkham, and Y.S. Ok, eds. *Spoil to Soil: Mine Site Rehabilitation and Revegetation*. Taylor and Francis.

Burger, J., V. Davis, J. Franklin, C. Zipper, J. Skousen, C. Barton, and P. Angel. Tree-compatible ground covers for reforestation and erosion control. Chapter 6, pp. 6-1–6-8. IN: Mary Beth Adams, ed. *The Forestry Reclamation Approach: Guide to Successful Reforestation of Mined Lands.* Gen. Tech. Rep. NRS-169. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northern Research Station. Published online: doi: 10.2737/NRS GTR-169.

Burger, J.A., C.E. Zipper, P.N. Angel, N. Hall, J.G. Skousen, C.D. Barton, and S.E. Eggerud. Establishing native trees on legacy surface mines. Chapter 10, pp. 10-1–10-12. IN: Mary Beth Adams, ed. *The Forestry Reclamation Approach: Guide to Successful Reforestation of Mined Lands.* Gen. Tech. Rep. NRS-169. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northern Research Station. Published online: doi:10.2737/NRS GTR-169.

French, M., C. Barton, B. McCarthy, C. Keiffer, J. Skousen, C. Zipper, and P. Angel. Selecting materials for mine soil construction when establishing forests on Appalachian mined lands. Chapter 3, pp.12-1–12-9. IN: Mary Beth Adams, ed. *The Forestry Reclamation Approach: Guide to Successful Reforestation of Mined Lands.* Gen. Tech. Rep. NRS-169. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northern Research Station. Published online: doi:10.2737/NRS GTR-169.

Skousen, J., C. Zipper, J. Burger, C. Barton, and P. Angel. Selecting materials for mine soil construction when establishing forests on Appalachian mined lands. Chapter 3, pp. 3-1–3-10. IN: Mary Beth Adams, ed. *The Forestry Reclamation Approach: Guide to Successful Reforestation of Mined Lands.* Gen. Tech. Rep. NRS-169. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northern Research Station. Published online: doi:10.2737/NRS GTR-169.

Stram, B., R. Sweigard, J. Burger, D. Graves, C. Zipper, C. Barton, J. Skousen, and P. Angel. Loosening compacted soils on mined lands. Chapter 5, pp. 5-1–5-6. IN: Mary Beth Adams, ed. *The Forestry Reclamation Approach: Guide to Successful Reforestation of Mined Lands.* Gen. Tech. Rep. NRS-169. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northern Research Station. Published online: doi: 10.2737/NRS GTR-169.

Sweigard, R., J. Burger, C. Zipper, J. Skousen, C. Barton, and P. Angel. Low compaction grading to enhance reforestation success on coal surface mines. Chapter 4, pp. 4-1–4-8. IN: Mary Beth Adams, ed. *The Forestry Reclamation Approach: Guide to Successful Reforestation of Mined Lands.* Gen. Tech. Rep. NRS-169. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northern Research Station. Published online: doi:10.2737/NRS GTR-169.

C.D. Barton contributed to one book chapter in Biosystems and Agricultural Engineering.

Horticulture

Sanchez-Barrios, A., M.R. Sahib, and S. DeBolt. "I've Got the Magic in Me": The microbiome of conventional vs organic production systems. IN: D. Singh, H. Singh, and R. Prabha, eds. *Plant-Microbe Interactions in Agro-Ecological Perspectives*. Springer, Singapore.

Yoder, R., and B. Rowell. Historical perspective on low-cost drip irrigation design and promotion. Chapter 11, pp 187–203. IN: J-P Venot, M. Kuper, and M. Zwarteveen, eds. *Drip Irrigation for Agriculture: Untold Stories of Efficiency, Innovation, and Development*. Routledge, London.

Landscape Architecture

Lee, B.D., D.I. Carey, and A.L. Jones, eds. *Water in Kentucky: Natural History, Communities, and Conservation.* University Press of Kentucky, Lexington, Kentucky.

Lee, B.D., C.L. Wilson, and A. Schörgendorfer. The Watershed Atlas Project: A different way to look at the Commonwealth. Chapter 19, pp. 193–201. IN: B.D. Lee, D.I. Carey, and A.L.

Jones, eds. *Water in Kentucky: Natural History, Communities, and Conservation*. University Press of Kentucky, Lexington.

Plant and Soil Sciences

Egli, D.B. *Seed Biology and the Yield of Grain Crops,* 2nd ed. CABI, Wallingford, UK.

Gepts, P., and T.W. Pfeiffer. From classical plant breeding to molecular crop improvement. Chapter 8, pp. 236–267. IN: M.J. Chrispeels and P. Gepts, eds. *Plants, Genes, and Agriculture: Sustainability through Biotechnology.* Sinauer Associates, Sunderland, MA.

Lee, B.D., and J. Kabrick. East and central farming and forest region and Atlantic basin diversified farming region: Land resource regions N and S. Chapter 12, pp. 227–241. IN: L.T. West, M.J. Singer, and A. Hartemink, eds. *Soils of the USA*. Springer, New York.

Lee, B.D., T.N. Williamson, A.S. Crain. Water quality and natural resources in the Green River Basin. Chapter 13, pp. 133–150. IN: B.D. Lee, A. Jones, D. Carey, and S. McSpirit, eds. *Water in Kentucky: Natural History, Communities, and Conservation*. University of Kentucky Press, Lexington.

Shaffer, C., G.D. Lacefield, and V. Marble. Alfalfa cutting management. Chapter 12. IN: C.H. Hansen, ed. *Agronomy Mimeograph No. 15. Alfalfa Science and Technology.*

Susaki, D., D. Maruyama, R. Yelagandula, F. Berger, and T. Kawashima. Live-cell imaging of F-actin dynamics during fertilization in *Arabidopsis thaliana*. Chapter 4, pp. 47–54. IN: A. Schmidt, ed. *Plant Germline Development: Methods in Molecular Biology,* vol. 1669. Humana Press, New York.

Yelagandula, R., A. Osakabe, E. Axelsson, F. Berger, and T. Kawashima. Genome-wide profiling of histone modifications and histone variants in *Arabidopsis thaliana* and *Marchantia polymorpha*. Chapter 7, pp. 93–106. IN: W. Busch, ed. *Plant Genomics: Methods in Molecular Biology,* vol. 1610. Humana Press, New York.

Plant Pathology

Bradley, C.A., and D.S. Mueller. Sclerotinia stem rot (white mold) of soybean in U.S.A. Pp. 131–140. IN: D. de Souza Jaccoud-Filho, L. Henneberg, and E.M.G. Grabicoski, eds. *Mofo Branco* Sclerotinia sclerotiorum. Todapalavra Editora LTDA, Ponta Grossa, Brazil.

Lim, G.H., R. Singhal, A. Kachroo, and P. Kachroo. Fatty acid- and lipid-mediated signaling in plant defense. Pp. 505–536 IN: J.E. Leach and S.E. Lindow, eds. *Annual Review of Phytopathology*, vol. 55. Palo Alto, CA.

Veterinary Science

Bannai, H., T. Kondo, and P.J. Timoney. Getah virus infection. IN: J.A.W. Coetzer, G.R. Thompson, J. MacLachlan, and A. Michel, eds. *Anipedia*. Published online: http://anipedia.org/publications/getah-virus-infection/1168.

Chambers, T.M. Vaccines and vaccination to control equine influenza. Chapter 21, pp. 524–547. IN: D.E. Swayne, ed. *Animal Influenza,* 2nd ed. John Wiley & Sons, Ames, IA.

Conley, A.J., and B.A. Ball. Endocrine testing for reproductive conditions in horses. Chapter 61, pp. 409–418. IN: N. Pusterla and J. Higgins, eds. *Interpretation of Equine Laboratory Diagnostics.* Wiley, Newark, NJ.

Landolt, G.A., and T.M. Chambers. The clinical features, pathobiology, and epidemiology of influenza infections in horses. Chapter 20, pp. 505–523. IN: D.E. Swayne, ed. *Animal Influenza*, 2nd ed. John Wiley & Sons, Ames, IA.

Progress Reports

PR-724: *2017 Kentucky Small Grains Variety Performance Test*
PR-725: *2017 Kentucky Hybrid Corn Performance Test*
PR-726: *Kentucky Corn Silage Hybrid Performance Report, 2017*
PR-727: *2017 Alfalfa Report*
PR-728: *2017 Red and White Clover Report*
PR-729: *2017 Orchardgrass Report*
PR-730: *2017 Tall Fescue and Bromegrass Report*
PR-731: *2017 Timothy and Kentucky Bluegrass Report*
PR-732: *2017 Annual and Perennial Ryegrass and Festulolium Report*
PR-733: *2017 Alfalfa Grazing Tolerance Report*
PR-734: *2017 Red and White Clover Grazing Tolerance Report*
PR-735: *2017 Cool-Season Grass Grazing Tolerance Report*
PR-736: *2017 Cool-Season Grass Horse Grazing Tolerance Report*
PR-737: *2017 Annual Grass Report: Warm Season and Cool Season (Cereals)*
PR-738: *2017 Long-Term Summary of Kentucky Forage Variety Trials*
PR-739: *2017 Fruit and Vegetable Research Report*
PR-740: *2017 Kentucky Soybean Performance Tests*

Regulatory Bulletins

RB-330: A*nalyses of Official Fertilizer Samples*, July 2015–June 2016
RB-331: *Seed Inspection Report*, 2016
RB-332: *Commercial Feeds in Kentucky*, 2016
Fertilizer Distribution Report, January–March 2017
Fertilizer Distribution Report, April–June 2017
Fertilizer Distribution Report, July–September 2017
F*ertilizer Distribution Report,* October–December 2017
Annual Fertilizer Distribution Report, July 2016–June 2017

Special Reports

SR-111: *Economic Analysis of the University of Kentucky Community Supported Agriculture Organic Vegetable Production System*

Refereed Journal Articles

Agricultural Economics

Allen, J.E., J.J. Rossi, T.A. Woods, and A.F. Davis. Do community supported agriculture programmes encourage change to food lifestyle behaviours and health outcomes? New evidence from shareholders. International Journal of Agricultural Sustainability 15:70–82.

Chen, B., S. Saghaian, and Y. Zheng. Organic labelling, private label, and U.S. household demand for fluid milk. Applied Economics. Published online: doi:10.1080/00036846.2017.1414936.

Chen, X., G. Qiu, L. Wu, G. Xu, J. Wang, and W. Hu. Influential impacts of combined government policies for safe disposal of dead pigs on farmer behavior. Environmental Science and Pollution Research 24:3997–4007.

Davis, T.D., J. Shepherd, and T.B. Mark. The case of liquidity problems and management alternatives during periods of low grain prices. Journal of American Society of Farm Managers and Rural Appraisers 2017:77–96.

Freshwater, D. The importance of improving incentives and employment opportunities for farm households in Poland. Wieś i Rolnictwo 176:11–33.

Hu, W., P. Qing, and L. Cox. Marketing of Hawai'i food products in China. Chinese Economy 50:157–167.

Kim, G., and T.B. Mark. Impacts of corn price and imported beef price on domestic beef price in South Korea. Agricultural and Food Economics. Published online: doi:10.1186/s40100-017-0074-0.

Kim, G., and Y. Zheng. U.S. nonalcoholic beverage demand: Evidence from AIDS model with dynamic effect. Journal of Agribusiness 35(1):1–14.

Lewis, K.E., C. Grebitus, G. Colson, and W. Hu. German and British consumer willingness to pay for beef labeled with food safety attributes. Journal of Agricultural Economics 68:451–470.

Mohamad, R., and Y. Zheng. Diffusion of international food safety standards: The role of domestic certifiers and international trade. Journal of Agricultural and Applied Economics 49(2):296–322.

Mohammadi, H., S. Saghaian, and P. Alizadeh. Prioritization of expanded marketing mix in different stages of the product life cycle: The case of food industry. Journal of Agricultural Science and Technology 19:993–1003.

Penn, J.M., H.J. Penn, M.F. Potter, and W. Hu. Bed bugs and hotels: Traveler insights and implications for the industry. American Entomologist 63:79–88.

Rossi, J., T. Woods, and J. Allen. CSA shareholder food lifestyle behaviors: A comparison across different consumer groups. Journal of Agriculture and Human Values 34:855–869.

Rossi, J.J., T.A. Woods, and J.E. Allen IV. Impacts of a community supported agriculture (CSA) voucher program on food lifestyle behaviors: Evidence from an employer-sponsored pilot program. Sustainability. Published online: doi:10.3390/su9091543.

Salassi, M., A. Holzapfel, B. Hilbun, M. Deliberto, K. Gravois, H. Viator, L. Falconer, and T.B. Mark. Feedstock crop production costs and biofuel feedstock input costs associated with the production of energy cane and sweet sorghum in the southeastern United States. BioEnergy Research 10:772–782.

Seok, J.H., G. Kim, T.B. Mark. The impact of minimum wage on food away from home expenditure using a structural equation model. International Journal of Food and Agricultural Economics 5(3):45–57.

Seok, J.H., G.S. Kim, M. Reed, and S. Kim. The impact of avian influenza on the Korean egg market: Who benefited? Journal of Policy Modeling. Published online: doi:10.1016/j.jpolmod.2017.11.003.

Wu, L., X. Gong, S. Qin, X. Chen, D. Zhu, W. Hu, and Q. Li. Consumer preferences for pork attributes related to traceability, information certification, and origin labeling: Based on China's Jiangsu province. Agribusiness: An International Journal 33:424–442.

Wu, L., G. Xu, Q. Li, B. Hou, W. Hu, and J. Wang. Investigation of the disposal of dead pigs by pig farmers in mainland China by simulation experiment. Environmental Science and Pollution Research 24:1469–1483.

Ye, T., M. Wang, W. Hu, Y. Liu, and P. Shi. High liabilities or heavy subsidies: Farmer preferences for crop insurance attributes. China Agricultural Economics Review 9:588–606.

Zheng, Y., A. Sassi, M. Muth, D. Birur, S. Karns, J. Brophy, and S. Bradley. The role of a production capacity limit in international trade policy analysis. Journal of International Agricultural Trade and Developments 10(2):167–181.
Zheng, Y., C. Zhen, D. Dench, and J. Nonnemaker. U.S. tobacco demand in a system framework. Health Economics 26(8):1067–1086.
Zhou, L., R. Ying, W. Hu, and D. Pan. Agricultural technical education and agrochemical use by rice farmers in China. Agribusiness: An International Journal 33:522–536.

T.A. Woods contributed to one article in Horticulture.

Animal and Food Sciences

Adedokun, S.A., A.J. Pescatore, M.J. Ford, J.P. Jacob, and A. Helmbrecht. Examining the effect of dietary electrolyte balance, energy source, and length of feeding of nitrogen-free diets on ileal endogenous amino acid losses in broilers. Poultry Science 96:3351–3360.
Adedokun, S.A., and O. Adeola. The response in jejunal and ileal nutrient and energy digestibility and the expression of markers of intestinal inflammation in broiler chickens to coccidial vaccine challenge and phytase supplementation. Canadian Journal of Animal Science 97:258–267.
Ali, A.B.A., K. Gutwein, and C.R. Heleski. Assessing the influence of upper lip twitching in naïve horses during an aversive husbandry procedure (ear clipping). Journal of Veterinary Behavior 21:20-25.
Ao, T., L.M. Macalintal, M.A. Paul, A.J. Pescatore, R.M. Delles, A.H. Cantor, M.J. Ford, and K.A. Dawson. Effects of dietary supplementation of organic minerals on the performance of broiler chicks fed oxidised soybean oil. Journal of Applied Animal Nutrition 5:e13.
Balcão, L.F., C. Longo, J.H.C. Costa, C. Uller-Gómez, L.C.P. Machado Filho, and M.J. Hötzel. Characterization of smallholding dairy farms in southern Brazil. Animal Production Science. Published online: doi:10.1071/AN15133.
Bewley, J.M., L.M. Robertson, and E.A. Eckelkamp. A 100-year review: Lactating dairy cattle housing management. Journal of Dairy Science 100(12):10418–10431.
Borchers, M.R., Y.M. Chang, K.L. Proudfoot, B.A. Wadsworth, A.E. Stone, and J.M. Bewley. Machine-learning–based calving prediction from activity, lying, and ruminating behaviors in dairy cattle. Journal of Dairy Science 100(7):5664–5674.
Bruno, K., E. Vanzant, A. Altman, M. Kudupoje, K. Vanzant, and K. McLeod. A novel objective chute score interacts with monensin to affect growth of receiving cattle. Journal of Animal Science 95(8):3310–3321.
Bruno, K., E. Vanzant, K. Vanzant, A. Altman, M. Kudupoje, and K. McLeod. Relationship between quantitative measures of temperament and other observed behaviors in growing cattle. Applied Animal Behaviour Science. Published online: doi:10.1016/j.applanim.2017.10.009.
Callahan, S.R., A.J. Cross, A.E. DeDecker, M.D. Lindemann, and M.J. Estienne. Effects of group-size floor space allowance during the nursery phase of production on growth, physiology, and hematology in replacement gilts. Journal of Animal Science 95:201–211. Published online: doi:10.2527/jas2016.0842.
Cao, Y.Y., and Y.L. Xiong. Binding of gallic acid and epigallocatechin gallate to heat-unfolded whey proteins at neutral pH alters radical scavenging activity of in vitro protein digests. Journal of Agricultural and Food Chemistry 65:8443–8450.
Cao, Y.Y., and Y.L. Xiong. Interaction of whey proteins with phenolic derivatives under neutral and acidic pH conditions. Journal of Food Science 82:409–419.
Cerny, K.L., R.A.C. Ribeiro, Q. Li, J.C. Matthews, and P.J. Bridges. Effect of lipopolysachharide (LPS) on the expression of inflammatory mRNAs and microRNAs in the mouse oviduct. Reproduction, Fertility and Development. Published online: doi:10.1071/RD17241.
Cho, J.H., N. Lu, and M.D. Lindemann. Effects of vitamin supplementation on growth performance and carcass characteristics in pigs. Livestock Science 204:25–32. Published online: doi:10.1016/j.livsci.2017.08.007.
Cooper, J.V., S.P. Suman, B.R. Wiegand, L. Schumacher, and C.L. Lorenzen. Light source influences color stability and lipid oxidation in steaks from low color stability beef triceps brachii muscle. Meat and Muscle Biology 1:149–156.
de Godoy, M.R.C., K.R. McLeod, and D.L. Harmon. Influence of feeding a fish oil-containing diet to mature, overweight dogs: Effects on lipid metabolites, postprandial glycemia, and body weight. Journal of Animal Physiology and Animal Nutrition 102(1):e155–e165. Published online: doi:10.1111/jpn.12723.
Dhakarey, R., M.L. Raorane, A. Treumann, P.K. Peethambaran, R.R. Schendel, V.P. Sahi, B. Hause, M. Bunzel, A. Henry, A. Kohli, and M. Riemann. Physiological and proteomic analysis of the rice mutant cpm2 suggests a negative regulatory role of jasmonic acid in drought tolerance. Frontiers in Plant Science 8:1903.
Gombeski, Jr., W.R., F.C. Camargo, H. Wiemers, C. Jehlik, P.S. Barger, and J. Mead. Preventing horse-related injuries by watching out for other humans. Journal of Outdoor Recreation and Tourism 19:11–16.
Gupta, P., B.L. Thompson, B. Wahlang, C.T. Jordan, J.Z. Hilt, B. Hennig, and T. Dziubla. Environmental pollutants and cardiovascular disease: A potential target for antioxidant nanotherapeutics. Drug Delivery and Translation Research PMID:28975503.
Hall, C., and C.R. Heleski. The role of the ethogram in equitation science. Applied Animal Behaviour Science 10:102–110.
Harlow, B.E., L.M. Lawrence, P.A. Harris, G.E. Aiken, and M.D. Flythe. Exogenous lactobacilli mitigate microbial changes associated with grain fermentation by equine fecal microflora ex vivo. PLoS ONE 12(3):e0174059.
Hennig, B. Environmental challenges in Central and Eastern Europe. Reviews on Environmental Health 32(1–2):1.
Himmelmann, H.K., B.W. Jones, and J.M. Bewley. Effects of the addition of electrolyzed water to a footbath solution on digital dermatitis incidence. Journal of Dairy, Veterinary and Animal Research 6(1):00168.
Hoffman, J.B., M.C. Petriello, and B. Hennig. Impact of nutrition on pollutant toxicity: An update with new insights into epigenetic regulation. Reviews on Environmental Health 32(1–2):65–72.
Hoffman, J.B., and B. Hennig. Protective influence of healthful nutrition on mechanisms of environmental pollutant toxicity and disease risks. Annals of the New York Academy of Sciences 1398(1):99–107. Published online: doi:10.1111/nyas.12265.
Jacob, J.P., and A.J. Pescatore. Glucans and the poultry immune system. American Journal of Immunology 13(1):45–49.
Jacobs, B.M., J.F. Patience, M.D. Lindemann, K.J. Stalder, and B.J. Kerr. Disappearance and appearance of an indigestible marker in feces from growing pigs as affected by previous- and current-diet composition. Journal of Animal Science and Biotechnology 8:32–40. Published online: doi:10.1186/s40104-017-0161-9.
Jang, Y.D., M.D. Lindemann, H.J. Monegue, and J.S. Monegue. The effect of coated sodium butyrate supplementation in sow and nursery diets on lactation performance and nursery pig growth performance. Livestock Science 195:13–20. Published online: doi:10.1016/j.livsci.2016.11.005.
Jang, Y.D., P. Wilcock, R.D. Boyd, and M.D. Lindemann. Effect of combined xylanase and phytase on growth performance, apparent total tract digestibility, and carcass characteristics in growing pigs fed corn-based diets containing high fiber coproducts. Journal of Animal Science 95:4005–4017. Published online: doi:10.2527/jas2017.1781.
Jang, Y.D., Y.L. Ma, R.L. Payne, and M.D. Lindemann. Amino acid composition of fetus, placenta, and uterus in gilts throughout gestation. Journal of Animal Science 95:4448–4461. Published online: doi:10.2527/jas2017.1836.
Jiang, J., X. Tang, Y. Xue, and Y.L. Xiong. Dietary linseed oil supplemented with organic selenium improves the fatty acid nutritional profile, muscular selenium deposition, and water binding in fresh pork. Meat Science 131:99–109.
Jones, B.W., A.E. Stone, C.L. Wood, K.J. McQuerry, J.D. Clark, D.L. Ray, and J.M. Bewley. Case study: Characterization of milk yield, lying and rumination behavior, gait, cleanliness, and lesions between two different freestall bases. The Professional Animal Scientist 33(1):140–149.
Lesiow, T., G.K. Rentfrow, and Y.L. Xiong. Polyphosphate and myofibrillar protein extract promote transglutaminase-mediated enhancements of rheological and textural properties of PSE pork batters. Meat Science 128:40–46.
Li, Q., R. Hegge, P.J. Bridges, and J.C. Matthews. Pituitary genomic expression profiles of steers are altered by grazing of high vs. low endophyte-infected forages. PLOS ONE 12:e0184612. Published online: doi:10.1371/journal.pone.0184612.
Liang, D., L.M. Arnold, C.J. Stowe, R.J. Harmon, and J.M. Bewley. Estimating U.S. dairy clinical disease costs with a stochastic simulation model. Journal of Dairy Science 100(2):1472–1486.
Miles, E.D., B.W. McBride, J.A. Boling, P.J. Bridges, and J.C. Matthews. Effect of 17β-estradiol administration on hepatic glutamine synthetase, β-catenin, and GPR30 in young and aged beef cows. Canadian Journal of Animal Sciences 97:281–289. Published online: doi:10.1139/CJAS-2016-0002.
Miles, E.D., B.W. McBride, P.J. Bridges, and J.C. Matthews. Effect of 17β-estradiol administration on hepatic expression of glutamine synthetase, β-catenin, and GPR30 in aged beef cows. Canadian Journal of Animal Science 97:281–289.
Nair, M.N., R. Ramanathan, G. Rentfrow, and S.P. Suman. Intramuscular variation in mitochondrial functionality of beef semimembranosus. South African Journal of Animal Science 47:635–639.

Neethling, N.E., S.P. Suman, G.O. Sigge, L.C. Hoffman, and M.C. Hunt. Exogenous and endogenous factors influencing color of fresh meat from ungulates. Meat and Muscle Biology 1:253–275.
Olukosi, O.A., S.A. Adedokun, and J.O. Agboola. Species-dependent response to the influence of adaptation length during assay for metabolizable energy of cereal grains employing the difference method. Animal Feed Science and Technology 231:111–118.
Pekel, A.Y., S,A. Adedokun, and O. Adeola. True phosphorus digestibility of camelina meal in broiler chickens. Canadian Journal of Animal Science. Published online: doi:10.1139/CJAS-2017-0075.
Perkins, J.T., M.C. Petriello, L. Xu, A. Stromberg, and B. Hennig. An open sourced statistical application for identifying complex toxicological interactions of environmental pollutants. Reviews on Environmental Health 32(1–2):23–26.
Petriello, M.C., J.A. Brandon, J. Hoffman, C. Wang, H. Tripathi, A. Abdel-Latif, X. Ye, X. Li, L. Yang, E. Lee, S. Soman, J. Barney, B. Wahlang, B. Hennig, and A.J. Morris. Dioxin-like PCB 126 increases systemic inflammation and accelerates atherosclerosis in lean LDL receptor deficient mice. Toxicology Science. Published online: PMID:29216392.
Petriello, M.C., J.B. Hoffman, A.J. Morris, and B. Hennig. Emerging roles of xenobiotic detoxification enzymes in metabolic diseases. Reviews on Environmental Health 32(1–2):105–110.
Raab, D., S. Dasgupta, J. Kelso, A.D. Wright, R.C. Bryant, A. Pescatore, and J. Jacob. Selling live heritage breed poultry to Hispanics. Journal of National Association of County Agricultural Agents 10(1). Published online: www.nacaa.com/journal/index.php?jid=695.
Reeves, S., J. Bewley, and M. Borchers. Evaluating teat skin condition in response to phenoxyethanol as a post-milking teat disinfectant on lactating dairy cows. Journal of Dairy Veterinary and Animal Research 6(2):00177. Published online: doi:10.15406/jdvar.2017.06.00177.
Reichenbach, H.B., B.W. Jones, and J.M. Bewley. Comparison of two footbath solutions for digital dermatitis control in dairy cattle: Two point two percent (2.2%) copper sulfate with an acidifier versus five percent (5%) copper sulfate. International Journal of Applied Research in Veterinary Medicine 15(2):130–134. Published online: http://www.jarvm.com/articles/Vol15Iss2/Vol15%20Iss2Jones.pdf.
Rosenberger, K., J.H.C. Costa, H.W. Neave, D.M. Weary, and M.A.G. von Keyserlingk. The effect of milk allowance on behavior and weight gains in dairy calves. Journal of Dairy Science 100:504–512.
Schilling, M.W., S.P. Suman, X. Zhang, M.N. Nair, M.A. Desai, K. Cai, M.A. Ciaramella, and P.J. Allen. Proteomic approach to characterize biochemistry of meat quality defects. Meat Science 132:131–138.
Stone, A.E., B.W. Jones, C.A. Becker, J.M. Bewley. Influence of breed, milk yield, and temperature-humidity index on dairy cow lying time, neck activity, reticulorumen temperature, and rumination behavior. Journal of Dairy Science 100(3):2395–2403.
Sun, N., P. Cui, S. Lin, C. Yu, Y. Tang, Y. Wei, Y.L. Xiong, and H. Wu. Characterization of sea cucumber (*Stichopus japonicus*) ovum hydrolysates: Calcium chelation, solubility, and absorption into intestinal epithelial cells. Journal of the Science of Food and Agriculture 97:4604–4611.
Tomasz, L., G. Rentfrow, and Y.L. Xiong. Polyphosphate and myofibrillar protein extract promote transglutaminase-mediated enhancements of rheological and textural properties of PSE pork meat batters. Meat Science 128:40–46.
Wahlang, B., J.T. Perkins, M.C. Petriello, J.B. Hoffman, A.J. Stromberg, and B. Hennig. A compromised liver alters polychlorinated biphenyl-mediated toxicity. Toxicology 380:11–22.
Wahlang, B., J. Barney, B. Thompson, C. Wang, O.M. Hamad, J.B. Hoffman, M.C. Petriello, A.J. Morris, and B. Hennig. PCB 126 exposure increases risk for peripheral vascular diseases in a liver injury mouse model. Toxicology Science 160(2):256–267. Published online: doi:10.1093/toxsci/kfx180.
Wang, D., M.D. Lindemann, Z. Zhi-kai, and P. Xiangshu. Mammary development in sows and factors affecting their development. China Journal of Animal Science 53(2):3–9.
Wang, X., Y.L. Xiong, and H. Sato. Rheological enhancement of pork myofibrillar protein-lipid emulsion composite gels via glucose oxidase oxidation/transglutaminase cross-linking pathway. Journal of Agricultural and Food Chemistry 65:8451–8458.
Wefers, D., J.J.V. Cavalcante, R.R. Schendel, J. Deveryshetty, K. Wang, Z. Wawrzak, R.I. Mackie, N.M. Koropatkin, and I. Cann. Biochemical and structural analyses of two cryptic esterases in *Bacteroides intestinalis* and their synergistic activities with cognate xylanases. Journal of Molecular Biology 439:2509–2527.
Wolfger, B., B.W. Jones, K. Orsel, and J.M. Bewley. Evaluation of an ear-attached real-time location monitoring system. Journal of Dairy Science 100(3):2219–2224.
Wu, J., M.N. Nair, S.P. Suman, S. Li, X. Luo, C.M. Beach, B.M. Bohrer, and D.D. Boler. Ractopamine-induced changes in sarcoplasmic proteome profile of post-rigor pork semimembranosus muscle. South African Journal of Animal Science 47:640–647.
Xiong, Y.L. Inhibition of hazardous compound formation in muscle foods by antioxidative phytochemicals. Annals of New York Academy of Science 1398:37–46.
Zhao, J., and W.L. Boatright. Static headspace analysis of odorants in commercial rice proteins. Food Chemistry 221:345–350. Published online: doi:10.1016/j.foodchem.2016.10.086.

J. Bewley contributed to one article in Biosystems and Agricultural Engineering.

Biosystems and Agricultural Engineering

Adedeji, A.A., E. Suhr, S. Bhadriraju, and S. Alavi. Drying characteristics of bean analog: A sorghum based extruded product. Journal of Food Processing and Preservation 41(2).
Adedeji, A.A., M.V. Joseph, B. Plattner, and S. Alavi. Physicochemical and functional properties of extruded sorghum-based bean analog. Journal of Food Process Engineering 40(2).
Adedeji, A.A., Y.G. Zhou, X.Y. Fang, D.A. Davis, A. Fahrenholz, and S. Alavi. Utilization of sorghum distillers dried grains in extruded and steam pelleted shrimp diets. Aquaculture Research 48(3):883–898.
Albino, R., J. Taraba, M. Marcondes, E. Eckelkamp, and J. Bewley. Comparison of bacterial populations in bedding material, on teat ends, and in milk of cows housed in compost bedded pack barns. Animal Production Science 58(9). Published online: doi:10.1071/AN16308.
Armstrong, P.R., E.B. Maghirang, B. Subramanyam, and S.G. McNeill. Equilibrium moisture content of kabuli chickpea, black sesame, and white sesame seeds. Applied Engineering in Agriculture 33(5):737–742.
Bhadra, R., M.E. Casada, J.M. Boac, A.P. Turner, S.A. Thompson, M.D. Montross, R.G. Maghirang, and S.G. McNeill. Correlating bulk density (with dockage) and test weight (without dockage) for wheat samples. Applied Engineering in Agriculture 32(6):925.
Bhadra, R., M.E. Casada, S.A. Thompson, J.M. Boac, R.G. Maghirang, M.D. Montross, A.P. Turner, and S.G. McNeill. Field-observed angles of repose for stored grain in the United States. Applied Engineering in Agriculture 33(1):131–137.
Blackburn-Lynch, W., C.T. Agouridis, and C.D. Barton. Development of regional curves for hydrologic landscape regions (HLR) in the contiguous United States. Journal of the American Water Resources Association 53(4):903–928.
Chattopadhyay, S., D.R. Edwards, and Y. Yu. Contemporary and future characteristics of precipitation indices in the Kentucky River basin. Water 9(2).
Chattopadhyay, S., D.R. Edwards, Y. Yu, and A. Hamidisepehr. An assessment of climate change impacts on future water availability and droughts in the Kentucky River basin. Environmental Processes: An International Journal 4(3):477–507.
Das, L., E.S. Liu, A. Saeed, D.W. Williams, H.Q. Hu, C.L. Li, A.E. Ray, and J. Shi. Industrial hemp as a potential bioenergy crop in comparison with kenaf, switchgrass and biomass sorghum. Bioresource Technology 244:641–649.
Das, L., S. Xu, and J. Shi. Catalytic oxidation and depolymerization of lignin in aqueous ionic liquid. Frontiers in Energy Research 5:21.
Dvorak, J.S., and N.Q. Zhang. Optimal design of velocity sensor for open channel flow using CFD. International Journal of Agricultural and Biological Engineering 10(3):130–142.
Edwards, D.R. Long-term spatio-temporal variation in runoff curve number under consistent cover conditions: A Southeastern U.S. case study. Water Resources Management 31(11):3491–3505.
Ekramirad, N., A. Rady, A.A. Adedeji, and R. Alimardani. Application of hyperspectral imaging and acoustic emission techniques for apple quality prediction. Transactions of the ASABE 60(4):1391–1401.
Evans, J.T., M.P. Sama, J.L. Taraba, and G.B. Day. Automated calibration of electrochemical oxygen sensors for use in compost bedded pack barns. Transactions of the ASABE 60(3):957–962.
Ford, W.I., and J.F. Fox. Stabilization of benthic algal biomass in a temperate stream draining agroecosystems. Water Research 108:432–443.
Ford, W.I., J.F. Fox, and E. Pollock. Reducing equifinality using isotopes in a process-based stream nitrogen model highlights the flux of algal nitrogen from agricultural streams. Water Resources Research 53(8):6539–6561.
Ford, W.I., K.W. King, M.R. Williams, and R.B. Confesor. Modified apex model for simulating

macropore phosphorus contributions to tile drains. Journal of Environmental Quality 46(6):1413–1423.
Hamidisepehr, A., M.P. Sama, A.P. Turner, and O.O. Wendroth. A method for reflectance index wavelength selection from moisture-controlled soil and crop residue samples. Transactions of the ASABE 60(5):1479–1487.
Hayes, M.D., T.M. Brown-Brandl, R.A. Eigenberg, L.A. Kuehn, and R.M. Thallman. Evaluating a new shade for feedlot cattle performance and heat stress. Transactions of the ASABE 60(4):1301–1311.
Holloway, L.E., Z.H. Qu, M.J. Mohr-Schroeder, J.C. Balda, A. Benigni, D.G. Colliver, P.A. Dolloff, R.A. Dougal, M.O. Faruque, Z.M. Fei, et al. A multi-institutional approach to delivering shared curricula for developing a next-generation energy workforce. IEEE Access 5:1416–1427.
Husic, A., J. Fox, C. Agouridis, J. Currens, W. Ford, and C. Taylor. Sediment carbon fate in phreatic karst (part 1): Conceptual model development. Journal of Hydrology 549:179–193.
Husic, A., J. Fox, W. Ford, C. Agouridis, J. Currens, and C. Taylor. Sediment carbon fate in phreatic karst (part 2): Numerical model development and application. Journal of Hydrology 549:208–219.
Liu, E.S., L. Das, B.Y. Zhao, M. Crocker, and J. Shi. Impact of dilute sulfuric acid, ammonium hydroxide, and ionic liquid pretreatments on the fractionation and characterization of engineered switchgrass. Bioenergy Research 10(4):1079–1093.
Mains, T.P., F.A. Payne, and M.P. Sama. Monitoring yogurt culture fermentation and predicting fermentation endpoint with fluorescence spectroscopy. Transactions of the ASABE 60(2):529–536.
Modenbach, A.A., S.E. Nokes, M.D. Montross, and B.L. Knutson. Toward biochemical conversion of lignocellulose on-farm: Pretreatment and hydrolysis of corn stover in situ. Transactions of the ASABE 60(4):1024–1032.
Rady, A., N. Ekramirad, A.A. Adedeji, M. Li, and R. Alimardani. Hyperspectral imaging for detection of codling moth infestation in Goldrush apples. Postharvest Biology and Technology 129:37–44.
Reichman, R., E. Shirazi, D.G. Colliver, and K.G. Pennell. U.S. residential building air exchange rates: New perspectives to improve decision making at vapor intrusion sites. Environmental Science: Processes & Impacts 19(2):87–100.
Rhea, N., J. Groppo, and C. Crofcheck. Evaluation of flocculation, sedimentation, and filtration for dewatering of Scenedesmus algae. Transactions of the ASABE 60(4):1359–1367.
Ruiz-Gonzalez, R., T.S. Stombaugh, V. Martinez-Martinez, and J. Gomez-Gil. An acoustic method for flow rate estimation in agricultural sprayer nozzles. Computers and Electronics in Agriculture 141:255–266.
Sama, M.P., G.B. Day, L.M. Pepple, and R.S. Gates. Fourth-generation fan assessment numeration system (FANS) design and performance specifications. Transactions of the ASABE 60(2):507–516.
Seyyedhasani, H., and J.S. Dvorak. Using the vehicle routing problem to reduce field completion times with multiple machines. Computers and Electronics in Agriculture 134:142–150.
Shepherd, T.A., H. Xin, J.P. Stinn, M.D. Hayes, Y. Zhao, and H. Li. Ammonia and carbon dioxide emissions of three laying-hen housing systems as affected by manure accumulation time. Transactions of the ASABE 60(1):229–236.
Shi, J., D. Wu, L.B. Zhang, B.A. Simmons, S. Singh, B. Yang, and C.E. Wyman. Dynamic changes of substrate reactivity and enzyme adsorption on partially hydrolyzed cellulose. Biotechnology and Bioengineering 114(3):503–515.
Singh, M., and A.A. Adedeji. Characterization of hydrothermal and acid modified proso millet starch. Lwt-Food Science and Technology 79:21–26.
Sun, J., J. Shi, N. Konda, D. Campos, D.J. Liu, S. Nemser, J. Shamshina, T. Dutta, P. Berton, G. Gurau, R.D. Rogers, B.A. Simmons, and S. Singh. Efficient dehydration and recovery of ionic liquid after lignocellulosic processing using pervaporation. Biotechnology for Biofuels 10.
Sympson, W., S.E. Nokes, and A.N. Hickman. Recirculating calcium hydroxide solution: A practical choice for on-farm high solids lignocellulose pretreatment. Industrial Crops and Products 97:492–497.
Turner, A.P., J.J. Jackson, N.K. Koeninger, S.G. McNeill, M.D. Montross, M.E. Casada, J.M. Boac, R. Bhadra, R.G. Maghirang, and S.A. Thompson. Stored grain volume measurement using a low density point cloud. Applied Engineering in Agriculture 33(1):105–112.
Williams, R.E., and D.R. Edwards. Effects of biochar treatment of municipal biosolids and horse manure on quality of runoff from fescue plots. Transactions of the ASABE 60(2):409–417.
Zhou, S.S., H.F. Li, R. Garlapalli, S.E. Nokes, M. Flythe, S.E. Rankin, and B.L. Knutson. Hydrolysis of model cellulose films by cellulosomes: Extension of quartz crystal microbalance technique to multienzymatic complexes. Journal of Biotechnology 241:42–49.
Zhu, L.J., A.A. Adedeji, and S. Alavi. Effect of germination and extrusion on physicochemical properties and nutritional qualities of extrudates and tortilla from wheat. Journal of Food Science 82(8):1867–1875.

Community and Leadership Development

Burmeister, L., and K. Tanaka. Fair labor practices in values-based agrifood supply chains? Journal of Agriculture, Food Systems, and Community Development 7(3):17–22.
Hill, J.C., B.J. Hains, K.G. Ricketts. Drumming: An innovative alternative for drug addicted individuals. Journal of Drug and Alcohol Education 61(2):7–21.
Tanaka, K. Mexican farm workers in large-scale agriculture in the United States. Agriculture and Economy 83(6):63–72.
Young, J., and K.R. Jones. Urban extension: Reflections on the past, a look to the future. Journal of Human Sciences and Extension 5(2):145–157.

Dietetics and Human Nutrition

Dewitt, E., T. Stephenson, K. Webber, and A. Gustafson. Community-based marketing campaign at farmers' markets as a way to encourage fruit and vegetable purchases among rural obese counties, Kentucky, 2015-2016. Preventing Chronic Disease 14:170010. Published online: doi:10.5888/pcd14.170010.
Gustafson, A. Shopping pattern and food purchase difference among Supplemental Nutrition Assistance Program (SNAP) households and non-Supplemental Nutrition Assistance Program households in the United States. Preventive Medicine Reports 7:152–157.
Gustafson, A., M. McGladrey, K. Webber, B. Butterworth, E. Liu, N. Peritore, and A. Vail. Examining key stakeholder and community residents' understanding of environmental influences to inform place-based interventions to reduce obesity in rural communities, Kentucky 2015. Journal of Rural Health. Published online: doi:10.1111/jrh.12254.
Gustafson, A., S. Jilcott Pitts, R. Gillespie, H. Ford, J. McDonald, P. Connelly, and J. Mullins. Direct effects of the home, school, and consumer food environments on the association between food purchasing patterns and dietary intake among rural adolescents in Kentucky and North Carolina. International Journal Environmental Rural Public Health 14(10):1–12.
Liu, E., T. Stephenson, J. Houlihan, and A. Gustafson. Marketing strategies to encourage rural residents of high-obesity counties to buy fruits and vegetables in grocery stores. Journal Preventing Chronic Disease 14:170109. Published online: doi:10.5888/pcd14.170109.

Entomology

Abram P., K. Hoelmer, A. Acebes-Doria, H. Andrews, E. Beers, J. C. Bergh, R. Bessin, D. Biddinger, P. Botch, M. Buffington, et al. Indigenous arthropod natural enemies of the invasive brown marmorated stink bug in North America and Europe. Journal of Pest Science 90(4):1009-1020. Published online: doi:10.1007/s10340-017-0891-7.
Angelella G.M., V. Nalam, P. Nachappa, J.A. White, and I. Kaplan. Endosymbionts differentially alter exploratory probing behavior of a nonpersistent plant virus vector. Microbial Ecology 76(2). Published online: doi:10.1007/s00248-017-1133-5.
Athey K.J., E.G. Chapman, and J.D. Harwood. A tale of two fluids: Does storing specimens together in liquid preservative cause DNA cross-contamination in molecular gut-content studies? Entomologia Experimentalis et Applicata 163(3):338–343.
Baughman T., C. Peterson, C. Ortega, S.R. Preston, C. Paton, J. Williams, A. Guy, G. Omodei, B. Johnson, H. Williams, S.L. O'Neill, S.A. Ritchie, S.L. Dobson, and D. Madan. A highly stable blood meal alternative for rearing Aedes and Anopheles mosquitoes. PLoS Negl Trop Dis 11(12):e0006142.
Burns, C.S., and C.W. Fox. Language and socioeconomics predict geographic variation in peer review outcomes at an ecology journal. Scientometrics 113:1113–1127. Published online: doi:10.1007/s11192-017-2517-5.
Chen, C., P. Han, W. Yan, S. Wang, X. Shi, X. Zhou, N. Desneux, and X. Gao. Uptake of quercetin reduces larval sensitivity to lambda-cyhalothrin in *Helicoverpa armigera*. Journal of Pest Science 91(2):919–926. Published online: doi:10.1007/s10340-017-0933-1.
Chen, G., Q. Su, X. Shi, X. Liu, Z. Peng, H. Zheng, W. Xie, B. Xu, S. Wang, Q. Wu, X. Zhou, and Y. Zhang. Odor, not performance, dictates *Bemisia tabaci*'s selection between healthy and virus infected plants. Frontiers in Physiology 8:146.
Crawley, S.E., J.R. Gordon, K.A. Kowles, M.F. Potter, and K.F. Haynes. Impact of sublethal exposure to a pyrethroid-neonicotinoid insecticide on mating, fecundity and development in the bed bug, *Cimex lectularius* L. (Hemiptera: Cimicidae). PLoS ONE 12(5):e077410. Published online: doi:10.1371/journal.pone.0177410.

Crawley, S.E., K.A. Kowles, J.R. Gordon, M.F. Potter, and K.F. Haynes. Behavioral effects of sublethal exposure to a combination of beta-cyfluthrin and imidacloprid in the bed bug, *Cimex lectularius* L. Pest Management Science 73:598–603.

Desneux, N., M.K. Asplen, C.M. Brady, G.E. Heimpel, K.R. Hopper, C. Luo, L. Monticelli, K.M. Oliver, and J.A. White. Intraspecific variation in facultative symbiont infection among native and exotic pest populations: Potential implications for biological control. Biological Control 116:29–35. Published online: doi:10.1016/j.biocontrol.2017.06.007.

Dye-Braumuller, K.C., K.F. Haynes, and G.C. Brown. Quantitative analysis of *Aedes albopictus* movement behavior following sublethal exposure to prallethrin. J American Mosquito Control Association 33:282–292.

Fox, C.W. Difficulty of recruiting reviewers predicts review scores and editorial decisions at six journals of ecology and evolution. Scientometrics 113:465–477. Published online: doi:10.1007/s11192-017-2489-5.

Fox, C.W., A.Y.K. Albert, and T.H. Vines. Recruitment of reviewers is becoming harder at some journals: A test of the influence of reviewer fatigue at six journals in ecology and evolution. Research Integrity and Peer Review 2:3. Published online: doi:10.1186/s41073-017-0027-x (data: 10.5061/dryad.2jr8p).

Fox, C.W., C.S. Burns, A.D. Muncy, and J.A. Meyer. Author-suggested reviewers: Gender differences and influences on the peer review process at an ecology journal. Functional Ecology 31:270–280. Published online: doi:10.1111/1365-2435.12665 (data: 10.5061/dryad.37312).

Fox, C.W., K. Thomson, D.J. Irschick, A.K. Knapp, C.R. White, E. Aimé, and J.A. Meyer. Thirty years of functional ecology. Functional Ecology 31:4–6.

Fox, C.W., R. Zitomer, J.B. Deas, and F.J. Messina. Asymmetric evolution of egg laying behavior following reciprocal host shifts by a seed-feeding beetle. Evolutionary Ecology 31:753–767. Published online: doi:10.1007/s10682-017-9910-7.

Fox, C.W., and T.A. Mousseau, eds. The year in evolutionary biology. Annals of the New York Academy of Sciences 1389:1–212.

Griffin, J.J., W.R. Jacobi, E.G. McPherson, C.S. Sadof, J.R. McKenna, M.L. Gleason, N.W. Gauthier, D.A. Potter, D.R. Smitley, G.C. Adams, et al. Ten-year performance of the United States national elm trial. Arboriculture and Urban Forestry 43:107–120.

Haynes, K.F. Editorial overview. Insect pheromones: Making sense of a rapidly diversifying field of study. Current Opinion Insect Science 24:VII–IX.

Hopper, K.R., K.L. Kuhn, K. Lanier, J.H. Rhodes, K.M. Oliver, J.A. White, M.K. Asplen, and G.E. Heimpel. The defensive aphid symbiont *Hamiltonella defensa* affects host quality differently for *Aphelinus glycinis* versus *Aphelinus atriplicis*. Biological Control 116:39. Published online: doi:10.1016/j.biocontrol.2017.05.008.

Jackson, K.A., J.S. McCord, and J.A. White. A window of opportunity: Subdominant predators can use suboptimal prey. Ecology and Evolution 14:5269–5275.

Jiang, M., X. Luo, D. Zhang, X. Zhou, X. Ouyang, Z. Zhang, F. Li, S. Zhang, and Y. Liu. A single-step reverse transcription loop-mediated isothermal amplification assay for rapid and accurate detection of pepper vein yellows virus. Canadian Journal of Plant Pathology. Published online: doi:10.1080/07060661.2017.1316774.

Kang, I., E.G. Chapman, D.J. Janzen, W. Hallwachs, M.A. Solis, and M.J. Sharkey. Revision of the species of *Lytopylus* from Area de Conservación Guanacaste, northwestern Costa Rica (Hymenoptera, Braconidae, Agathidinae). ZooKeys 721:93–158.

Kalsi, M., and S.R. Palli. Cap n collar transcription factor regulates multiple genes coding for proteins involved in insecticide detoxification in the red flour beetle, *Tribolium castaneum*. Insect Biochemistry and Molecular Biology 90:43–52. Published online: doi:10.1016/j.ibmb.2017.09.009. PMID:28951207.

Kalsi, M., and S.R. Palli. Transcription factor cap n collar C regulates multiple cytochrome P450 genes conferring adaptation to potato plant allelochemicals and resistance to imidacloprid in *Leptinotarsa decemlineata* (Say). Insect Biochemistry and Molecular Biology 83:1–12. Published online: doi:10.1016/j.ibmb.2017.02.002. PMID:28189748.

Kébé, K., N. Alvarez, M. Tuda, G. Arnqvist, C.W. Fox, M. Sembène, and A. Espíndola. Global phylogeography of the insect pest *Callosobruchus maculatus* (Coleoptera: Bruchinae) relates to the history of its main host, *Vigna unguiculata*. Journal of Biogeography 44:2515–2526. Published online: doi:10.1111/jbi.13052.

Kou, F., H. Li, S. Li, H. Xun, Y. Zhang, Z. Sun, X. Zhou, and W. Cai. Temporal transcriptomic profiling of the ant-feeding assassin bug *Acanthaspis cincticrus* reveals a biased expression of genes associated with predation in nymphs. Scientific Reports 7:12691.

Lacki, M.J., L.E. Dodd, N.S. Skowronski, M.B. Dickinson, and L.K. Rieske. Relationships among burn severity, forest canopy structure and bat activity from spring burns in oak-hickory forests. International Journal of Wildland Fire. Published online: doi:10.1071/WF16159.

Lenhart, P.A., and J.A. White. A defensive endosymbiont fails to protect aphids against the parasitoid community present in the field. Ecological Entomology 42:680–684. Published online: doi:10.1111/een.12419.

Li, H, J.M. Leavengood Jr., E.G. Chapman, D. Burkhardt, F. Song, P. Jiang, J.P. Liu, X. Zhou, and W.Z. Cai. Mitochondrial phylogenomics of Hemiptera reveals adaptive innovations driving the diversification of true bugs. Proceedings, Royal Society B: Biological Sciences 284(1862). Published online: doi:10.1098/rspb.2017.1223.

Liu, H., Q. Liu, X. Zhou, Y. Huang, and Z. Zhang. Genome editing of Wnt-1, a gene associated with segmentation, via CRISPR/Cas9 in the pine caterpillar moth, *Dendrolimus punctatus*. Frontiers in Physiology 7:666.

Liu, X., L. Xie, N. Liu, S. Zhan, X. Zhou, and Q. Wang. RNA interference unveils the importance of *Pseudotrichonympha grassii cellobiohydrolase*, a protozoan exoglucanase, in termite cellulose degradation. Insect Biochemistry Molecular Biology 26(2):233–242.

Mach, B.M., S. Bondarenko, and D.A. Potter. Uptake and dissipation of neonicotinoid residues in nectar and foliage of systemically treated woody landscape plants. Environmental Toxicology and Chemistry 9999:1–11. Published online: doi:10.1002/etc.4021.

Miller, D.M., C.T. Redmond, M.D. Flythe, and D.A. Potter. Evaluation of 'Jackal' AR601(Avanex) and Kentucky-31 endophytic tall fescues for suppressing types of invertebrates that contribute to bird strike hazard at airports. Crop, Forage, and Turfgrass Management 3(1):1–11. Published online: doi:10.2134/cftm2017.03.0023.

Niu K., X. Zhang, H. Deng, F. Wu, Y. Ren, H. Xiang, S. Zheng, L. Liu, L. Huang, B. Zeng, S. Li, Q. Xia, Q. Song, S.R. Palli, and Q. Feng. BmILF and i-motif structure are involved in transcriptional regulation of BmPOUM2 in *Bombyx mori*. Nucleic Acids Research. Published online: doi:10.1093/nar/gkx1207. PMID:29194483.

Palli S.R. Introduction. Annual Review of Entomology 62:v–vii. Published online: doi:10.1146/annurev-en-62-020117-100001. PMID:28146636.

Palli, S.R. New roles for old actors, ROS and PRMT1. Proceedings of the National Academy of Sciences USA 114(41):10810-10812. Published online: doi:10.1073/pnas.1715062114. PMID:28973953; PMCID:PMC5642735.

Pan, H., X. Yang, K. Bidne, R.L. Hellmich, B.D. Siegfried, and X. Zhou. Dietary risk assessment of v-ATPase A dsRNAs on monarch butterfly larvae. Frontiers in Plant Science 8:242.

Penn, H.J., K.J. Athey, and B.D. Lee. Land cover diversity increases predator spatial aggregation to and consumption of prey. Ecology Letters 20(5):609–618.

Penn, J.M., H.J. Penn, M.F. Potter, and W. Hu. Bed bugs and hotels: Traveler insights and implications for the industry. American Entomologist 63(2):79–88.

Pook, V., K.J. Athey, E.G. Chapman, S. Clutts-Stoelb, and M.J. Sharkey. New PCR primers enhance investigation of host-parasitoid food-webs. Entomologia Experimentalis et Applicata 162(3):309–314.

Redmond, C.T., and Potter D.A. Chlorantraniliprole: Reduced-risk insecticide for controlling insect pests of woody ornamentals with low hazard to bees. Arboriculture and Urban Forestry 43:242–256.

Rittschof, C.C. Sequential social experiences interact to modulate aggression but not brain gene expression in the honeybee (*Apis mellifera*). Frontiers in Zoology 14:1–10.

Rittschof, C.C., and S. Schirmeier. Insect models of central nervous system energy metabolism and its links to behavior. GLIA. Published online: doi:10.1002/glia.232352017.

Rodrigues, T.B., L.K. Rieske, J.J. Duan, K. Mogilicherla, S.R. Palli. Development of RNAi method for screening candidate genes to control emerald ash borer, *Agrilus planipennis*. Scientific Reports 7:7379. Published online: doi:10.1038/s41598-017-07605-x.

Rodrigues, T.B., R.K. Dhandapani, J.J. Duan, and S.R. Palli. RNA interference in the Asian longhorned beetle: Identification of key RNAi genes and reference genes for RT-qPCR. Scientific Reports 7(1):8913. Published online: doi:10.1038/s41598-017-08813-1. PMID:28827780; PMCID:PMC5566337.

Roy, A., S. George, and S.R. Palli. Multiple functions of CREB-binding protein during postembryonic development: Identification of target genes. BMC Genomics 18(1):996. Published online: doi:10.1186/s12864-017-4373-3. PMID:29284404; PMCID:PMC5747157.

Sethuraman, A., F.J. Janzen, M.A. Rubio, Y. Vasquez, and J.J. Obrycki. Demographic histories of three predatory lady beetles reveal complex patterns of diversity and population size change in the United States. Insect Science. Published online: doi:10.1111/1744-7917.12481.

Sharkey, M.J., and E.G. Chapman. Ten new genera of Agathidini (Hymenoptera: Braconidae: Agathidinae) from Southeast Asia. Zookeys 660:107–150.
Shi, X., H. Pan, W. Xie, S. Wang, Q. Wu, G. Chen, L. Tian, X. Zhou, Y. Liu, and Y. Zhang. Different effects of exogenous jasmonic acid on preference and performance of viruliferous *Bemisia tabaci* B and Q. Entomologia Experimentalis et Applicata 165:148–158.
Singh, I.K., S. Singh, K. Mogilicherla, J.N. Shukla, and S.R. Palli. Comparative analysis of double-stranded RNA degradation and processing in insects. Scientific Reports 7(1):17059. Published online: doi:10.1038/s41598-017-17134-2. PMID:29213068; PMCID:PMC5719073.
Skidmore, A., N. Wilson, M. Williams, and R. Bessin. The impact of tillage regime and row cover use on insect pests and yield in organic cucurbit production. Journal of Agriculture. Published online: doi:10.1017/S1742170517000503.
Su, P., X. Tan, C. Li, D. Zhang, J. Cheng, S. Zhang, X. Zhou, Q. Yan, J. Peng, Z. Zhang, Y. Liu, and X. Lu. Photosynthetic bacterium *Rhodopseudomonas palustris* GJ-22 induces systemic resistance against viruses. Microbial Biotechnology 10(3):612–624.
Suh, E., D.R. Mercer, and S.L. Dobson. Life-shortening Wolbachia infection reduces population growth of *Aedes aegypti*. Acta Tropica 172:232–239.
Sun, Q., K.F. Haynes, J.D. Hampton, and X.G. Zhou. Sex-specific inhibition and stimulation of worker-reproductive transition in a termite. Science of Nature 104:13. Published online: doi:10.1007/s00114-017-1501-5.
Sun, Q., K.F. Haynes, and X.G. Zhou. Dynamic changes in death cues modulate risks and rewards of corpse management in a social insect. Functional Ecology 31:697–706.
Tang, X., X. Shi, D. Zhang, F. Li, F. Yan, Y. Zhan, Y. Liu, and X. Zhou. Detection and epidemic dynamic of ToCV and CCYV with *Bemisia tabaci* and weed in Hainan of China. Virology Journal 14:196.
Telschow, A., F. Grziwotz, P. Crain, T. Miki, J.W. Mains, G. Sugihara, S.L. Dobson, and C.H. Hsieh. Infections of Wolbachia may destabilize mosquito population dynamics. Journal of Theoretical Biology 428:98–105.
Tian, L., E.L. Preisser, K.F. Haynes, and X.G. Zhou. Social buffering in a eusocial invertebrate: Termite soldiers reduce the lethal impact of competitor cues on workers. Ecology 98:952–960.
Tian, L., T. Song, R. He, Y. Zeng, W. Xie, Q. Wu, S. Wang, X. Zhou, and Y. Zhang. Genome-wide analysis of ATP-binding cassette (ABC) transporters in the sweetpotato whitefly, *Bemisia tabaci*. BMC Genomics 18:330.
Wang J., Y. Peng, K. Xiao, B. Wei, J. Hu, Z. Wang, Q. Song, and X. Zhou. Transcriptomic response of wolf spider, *Pardosa pseudoannulata*, to transgenic rice expressing *Bacillus thuringiensis* Cry1Ab protein. BMC Biotechnology 17:7.
Wen, D., C. Rivera-Perez, M. Abdou, Q. Jia, Q. He, X. Liu, O. Zyaan, J. Xu, W.G. Bendena, S.S. Tobe, F.G. Noriega, S.R. Palli, J. Wang, and S. Li. Correction: Methyl farnesoate plays a dual role in regulating drosophila metamorphosis. PLoS Genet. 13(1):e1006559. Published online: doi:10.1371/journal.pgen.1006559. PMID:28107360; PMCID:PMC5249045.
White, J.A., J.M. McCord, K.A. Jackson, A.K. Dehnel, and P.A. Lenhart. Differential aphid toxicity to ladybeetles is not a function of host plant or facultative bacterial symbionts. Functional Ecology 31:334–339.
Xie, W., C. Chen, Z. Yang, L. Guo, X. Yang, D. Wang, M. Chen, J. Huang, Y. Wen, Y. Zeng, et al. Genome sequencing of the sweetpotato whitefly *Bemisia tabaci* MED/Q. Giga Science 6(5):1–7.
Yoon, J.S., D. Gurusamy, and S.R. Palli. Accumulation of dsRNA in endosomes contributes to inefficient RNA interference in the fall armyworm, *Spodoptera frugiperda*. Insect Biochemistry and Molecular Biology 90:53–60. Published online: doi:10.1016/j.ibmb.2017.09.011. PMID:28951282.
Yuan, G., Y. Wan, X. Li, B. He, Y. Zhang, B. Xu, S. Wang, W. Xie, X. Zhou, and Q. Wu. Development of near-isogenic lines in a parthenogenetically reproduced thrips species, *Frankliniella occidentalis*. Frontiers in Physiology 8:130.
Zapata, S.D., R. Dudensing, D. Sekula., G. Esparza-Diaz, and R.T. Villanueva. Economic impact of the sugarcane aphid outbreak in south Texas. Journal of Agricultural and Applied Economics 50(1):1–25. Published online: doi:10.1017/aae.2017.24.
Zeng, B., Y. Huang, J. Xu, T. Shiotsuki, H. Bai, S.R. Palli, Y. Huang, and A. Tan. The FOXO transcription factor controls insect growth and development by regulating juvenile hormone degradation in the silkworm, *Bombyx mori*. Journal of Biological Chemistry 292(28):11659–11669. Published online: doi:10.1074/jbc.M117.777797. PMID:28490635; PMCID:PMC5512063.

Family Sciences

Culp, III, K., and L.R. Bullock. 4-H volunteer continuing education academy. Journal of Extension 55(4):4IAW4. Published online: https://www.joe.org/joe/2017august/iw4.php.
Culp, III, K., H. Edwards, and J. Jordan. One of these things is not like the others: Differentiating between boards, councils, committees, and advisory groups. e-Volunteeerism 17(2). Published online: https://www.e-volunteerism.com/Boards_Councils_Committees_Advisory_Groups.
Culp, III, K., R. Hance, L.R. Reynolds, and G.S. Bentley. Online orientation for 4-H volunteers. Journal of Extension 54(6):6TOT2. Published online: https://joe.org/joe/2016december/tt2.php.
Frey, L.M., J.D. Hans, and L. Cerel. An interpretive phenomenological inquiry of family and friend reaction to suicide disclosure. Journal of Marital and Family Therapy 43:159–172. Published online: doi:10.1111/jmft.12180.
Gillen, M., and C.J. Heath. Effects of receipt of Social Security retirement benefits on older women's employment. Journal of Women and Aging 29(5):448–459. Published online: doi:10.1080/08952841.2016.1214035.
Gillen, M., K.A. Zurlo, and H. Kim. Do financial constraints affect depressive symptomatology among mid-aged and older adults? The International Journal of Aging and Human Development 85(4):438–455.
Harris, C., A.T. Vazsonyi, and J. Bolland. Bidirectional relationships between parenting processes and deviance in a sample of inner-city African American youth. Journal of Research on Adolescence 27(1):201–213. Published online: doi:10.1111/jora.12267.
Hunter, J.L., and C.J. Heath. The relationship between credit card use behavior and household well-being during the Great Recession: Implications for the ethics of credit use. Journal of Financial Counseling and Planning 28(2):213–224.
Kahumoku, E.P., A.T. Vazsonyi, A. Haque, and M. Brown. Body dissatisfaction and mental health across ethnic/racial and immigrant groups: Implications for marriage and family therapists. The American Journal of Family Therapy 45(3):175–193. Published online: doi:10.1080/01926187.2017.1303652.
Kim, H., Q. Zhang, and R. Svynarenko. Personality traits and health literacy. Journal of Family Medicine and Community Health 4(1):1102–1108.
Kim, H., S. Shin, C.J. Heath, Q. Zhang, and E.T. Higgins. Regulatory mode and willingness to increase retirement savings contributions. Journal of Applied Social Psychology 47(8):436–445.
Kimberly, C., P. Clark, and R. Werner-Wilson. 2016. From research to practice: Increasing ability of practitioners to relate family-of-origin communicative techniques to current marital satisfaction. Journal of Human Sciences and Extension 4:51–69.
Özdemir, Y., A.T. Vazsonyi, and F. Cok. Parenting processes, self-esteem, and aggression: A mediation model. European Journal of Developmental Psychology 14(5):509–532. Published online: doi:10.1080/17405629.2016.1240674.
Vazsonyi, A.T., and A. Ksinan. Understanding adolescent deviance through the dual systems model: Converging evidence for criminology and developmental sciences. Personality and Individual Differences 111:58–64. Published online: doi:10.1016/j.paid.2017.01.030.
Vazsonyi, A.T., G. Ksinan Jiskrova, Y. Özdemir, and M. Bell. Bullying and cyberbullying in Turkish adolescents: Testing direct and indirect effects of maternal and paternal parenting processes. Journal of Cross-Cultural Psychology 48(8):1153-1171. Published online: doi:10.1177/0022022116687853.
Vazsonyi, A.T., J. Mikuska, and Z. Gassova. Revisiting the immigrant paradox: Suicidal ideations and suicide attempts among immigrant and non-immigrant adolescents. Journal of Adolescence 59:67–78. Published online: doi:10.1016/j.adolescence.2017.05.008.
Vazsonyi, A.T., J. Mikuska, and E. Kelley. It's time: A meta-analysis of the self-control-deviance link. Journal of Criminal Justice 48:48–63. Published online: doi:10.1016/j.jcrimjus.2016.10.001.
Weisenhorn, D.A., L. Frey, J.D. Hans, and J. Cerel. Suicide ideation, anxiety, and depression: Are children a protective factor for veterans? Journal of Family Social Work 20:41–51. Published online: doi:10.1080/10522158.2017.1286278.
Wood, N.D., and I.A. Okhotnikov. Spatial statistics for dyadic data: Analyzing the relationship landscape. Journal of Marital and Family Therapy 43(1):51–64. Published online: doi:10.1111/jmft.12179.

Forestry

Agha, M., S.J. Price, A.J. Nowakowski, B. Augustine, and B.D. Todd. Mass mortality of eastern box turtles (*Terrapene carolina*) due to upper respiratory disease and associated with atypical cold temperatures and Ranavirus. Diseases of Aquatic Animals 124:91–100.
Agha, M., A.L. Smith, J.E. Lovich, D. Delaney, J.R. Ennen, J. Briggs, L.J. Fleckenstein, L.A. Tennant, S.R. Puffer, A. Walde, T.R. Arundel, S.J. Price,

and B.D. Todd. Mammalian mesocarnivore visitation at desert tortoise burrows in a wind farm. Journal of Wildlife Management 81:1117–1124.
Arthur, M.A., B.A. Blankenship, A. Schorgendorfer, and H.D. Alexander. Alterations to the fuel bed after single and repeated prescribed fires in an Appalachian hardwood forest. Forest Ecology and Management 403:126–136.
Arthur, M.A., K.C. Weathers, G.M. Lovett, M.P. Weand, and W.C. Eddy. A beech bark disease induced change in tree species composition influences forest floor acid-base chemistry. Canadian Journal for Forest Research 47:875–882.
Bell, G., K.L. Sena, C.D. Barton, and M. French. Establishing pine monocultures and mixed pine-hardwood stands on reclaimed surface mined land in Eastern Kentucky: Implications for forest resilience in a changing climate. Forests 8:375. Published online: doi:103390/f8100375.
Brandeis, T., S. Zarnochb, C. Oswalt, and J. Stringer. The lack of adequate quality assurance/quality control data hinders the assessment of potential forest degradation in a national forest inventory. Forest Ecology and Management 396:176–183.
Bray, S.R., A.M. Hoyt, Z. Yang, and M.A. Arthur. Non-native liana, *Euonymus fortunei,* associated with increased soil nutrients, unique soil bacterial communities, and faster leaf decomposition. Plant Ecology 218:329–343.
Cilles, S.E., G. Coy, C.R. Stieha, J.J. Cox, P.H. Crowley, and D.S. Maehr. A comparison of seed predation, seed dispersal, and seedling herbivory in oak and hickory: Species with contrasting regenerating abilities in a Bluegrass savanna-woodland habitat. Northeastern Naturalist 23:466–481.
Contreras, M., W. Staats, J. Yang, and D. Parrott. Quantifying the accuracy of LiDAR-derived DEM in deciduous eastern forests of the Cumberland Plateau. Journal of Geographic Information System 9:339-353.
Contreras, M., R. Freitas, L. Ribeiro, J.W. Stringer, and C. Clark. Multi-camera surveillance systems for time and motion studies of timber harvesting equipment. Computers and Electronics in Agriculture 135:208–215.
Cox, J.J., B. Slabach, J.T. Hast, S.M. Murphy, O.C. Kwok, and J.T. Dubey. High seroprevalence of *Toxoplasma gondii* in elk (*Cervus canadensis*) of the central Appalachians, USA. Parasitology Research 116:1079–1083.
Cox, J.J., S.M. Murphy, B.C. Augustine, J.M. Guthrie, J.T. Hast, S.C. Maehr, and J. McDermott. Seroprevalence of *Toxoplasma gondii* in American black bears (*Ursus americanus*) of the central Appalachians, USA. Journal of Wildlife Diseases 54. Published online: doi:10.7589/2016-08-188.
Drayer, A, K. Sena, C. Barton, and D. Andrews. Long-term response of stream and riparian restoration at Wilson Creek, Kentucky, USA. Ecological Restoration 35(3):246–254.
Hamraz, H., M. Contreras, and J. Zhang. Forest understory trees revealed within sufficiently dense airborne laser scanning point clouds. Scientific Reports 7:6770.
Hamraz, H., M. Contreras, and J. Zhang. Vertical stratification of forest canopy for segmentation of understory trees within small-footprint airborne LiDAR point clouds. ISPRS Journal of Photogrammetry and Remote Sensing 130:385–392.
Hamraz, H., M. Contreras, and J. Zhang. A scalable approach for tree segmentation within small-footprint airborne. Computers and Geosciences 102:139–174.
Hutton, J.M., S.J. Price, and S.C. Richter. The diet of the Cumberland Plateau salamander (*Plethodon kentucki*) in an old growth forest of southeastern Kentucky. American Midland Naturalist 178:144–150.
Keyser, T.L., M.A. Arthur, and D.L. Loftis. Repeated burning alters the structure and composition of hardwood regeneration in oak-dominated forests of Eastern Kentucky, USA. Forest Ecology and Management 393:1–11.
Lacki, M.J., L.E. Dodd, N.S. Skowronski, M.B. Dickinson, and L.K. Rieske. Relationships among burn severity, forest canopy structure and bat activity from spring burns in oak-hickory forests. International Journal of Wildland Fire 26:963–972.
Lal, P., B. Wolde, M. Masozera, P. Burli, J. Alavalapati, A. Ranjan, J. Montambault, O. Banerjee, T.O. Ochuodho, and R. Mugabo. Valuing visitor services and access to protected areas: The case of Nyungwe National Park in Rwanda. Tourism Management 61:141–151.
Lhotka, J.M. Examining growth relationships in *Quercus* stands: An application of individual tree models developed from long-term thinning experiments. Forest Ecology and Management 385:65–77.
Lin, P., R. Dai, M.A. Contreras, and J. Zhang. Combining ant colony optimization with 1-opt local search method for solving constrained forest transportation planning problems. Artificial Intelligence Research 6(2):27–38.
Liu, B., J. Yang, and J.F. Johnstone. Understory vascular plant community assembly in relation to time-since-fire and environmental variables in a Chinese boreal forest. Journal of Mountain Science 14(7):1317–1328.
Millard, R., P. Withey, V. Lantz, and T.O. Ochuodho. The general equilibrium costs and impacts of oil price shocks in Newfoundland and Labrador. Energy Economics 68:192–198.
Murphy, S.M., W.A. Ulrey, B.C. Augustine, J.M. Guthrie, and J.J. Cox. Natural genetic rescue of a low-density carnivore population inhabiting a severely fragmented landscape. PLoS ONE 12(7):e0181849.
Murphy, S.M., W.A. Ulrey, J.M. Guthrie, D.S. Maehr, W.G. Abrahamson, S.C. Maehr, and J.J. Cox. Food habits of a small Florida black bear population in an endangered ecosystem. Ursus 28:92–104.
Ochuodho, T.O., C.M.T. Johnston, and P. Withey. Assessing economic impacts of internet adoption through reduced pulp and paper demand. Canadian Journal of Forest Research 47:1381–1391.
Price, S.J. Book Review: Amphibians and reptiles of Land Between the Lakes. Herpetological Review 48:238–239.
Qi, L., and J. Yang. Microbial community composition regulates SOC decomposition response to forest conversion in a Chinese temperate forest. Ecological Research 32(2):163–172.
Sanderson, T.M., C.D. Barton, C. Cotton, and T. Karathanasis. Long-term evaluation of acidic atmospheric deposition on soils and soil solution chemistry in the Daniel Boone National Forest, USA. Water, Air and Soil Pollution 228:403.
Shifley, S.R., H.S. He, H. Lischke, W.J. Wang, W. Jin, E.J. Gustafson, J.R. Thompson, F.R. Thompson, W.D. Dijak, and J. Yang. The past and future of modeling forest dynamics: From growth and yield curves to forest landscape models. Landscape Ecology 32(7):1307–1325.
Thalken, M.M., and M.J. Lacki. Tree roosts of northern long-eared bats following white-nose syndrome. Journal of Wildlife Management. Published online: doi:10.1002/jwmg.21411.
Todd, B.D., A.J. Nowakowski, J.P. Rose, and S.J. Price. Species traits explaining sensitivity of snakes to human land use estimated from citizen science data. Biological Conservation 206:31–36.
Wang, J., F. Zhao, J. Yang, and X. Li. Mining site reclamation planning based on land suitability analysis and ecosystem services evaluation: A case study in Liaoning Province, China. Sustainability 9(6):890.
Yang, Y., R.D. Yanai, C.R. See, and M.A. Arthur. Sampling effort and uncertainty in leaf litterfall mass and nutrient flux in northern hardwood forests. Ecosphere 8(11).
Yang, Y.Z., W.H. Cai, and J. Yang. Evaluation of MODIS land surface temperature data to estimate near-surface air temperature in Northeast China. Remote Sensing 9(5):410.

C.D. Barton contributed to one article in Biosystems and Agricultural Engineering.

Horticulture

Antonious, G.F. Diversity in capsaicin and dihydrocapsaicin content in hot pepper genotypes. JSM Environmental Science and Ecology 5:1042. Published online: https://www.jscimedcentral.com/EnvironmentalScience/environmentalscience-5-1042.pdf.
Antonious, G.F., A.G. Antonious, and T.G. Trivette. Screening previously uncharacterized genotypes of hot pepper for ascorbic acid, phenols, β-carotene, and soluble sugars content. JSM Environmental Science and Ecology 5:1046. Published online: https://www.jscimedcentral.com/EnvironmentalScience/environmentalscience-5-1046.pdf.
Antonious, G.F., E.T. Turley, A.G. Antonious, and T. Trivette. Emerging technology for increasing glucosinolates in arugula and mustard greens. Journal of Environmental Science and Health Part B 52:466–469. Published online: http://www.tandfonline.com/eprint/vmMAbXMqKHzgQeMAYFsj/full\.
Antonious, G.F., E.T. Turley, and T.S. Kochhar. Testing bioaccumulation of Cd, Pb, and Ni in plants grown in soil amended with municipal sewage sludge at three Kentucky locations. JSM Environmental Science and Ecology 5(1):1039. Published online: https://jscimedcentral.com/EnvironmentalScience/environmentalscience-5-1039.pdf.
Antonious, G.F., E.T. Turley, A. Mutari, and J.C. Snyder. Dissipation, half-lives, and mass spectrometric identification of chlorpyrifos and its two metabolites on field-grown collard and kale. Journal of Environmental Science and Health Part B 52:251–255. Published online: http://www.tandfonline.com/eprint/SBbFzWtjqXwUeaN4RGTa/full.
Brabham, C., M. Barrett, J. Stork, and S. DeBolt. Grass cell walls have a role in the inherent tolerance of grasses to the cellulose biosynthesis inhibitor isoxaben. Pest Management Science 74(4):878–884. Published online: doi:10.1002/ps.4779.
Geneve, R.L., D.F. Hildebrand, T.D. Phillips, M. AL-Amery, and S.T. Kester. Stress influences seed germination in mucilage-producing chia. Crop Science 57:2160–2169.

Grable, C., J. Knight, and D.L. Ingram. Plant growth and leachate electrical conductivity and pH as influenced by controlled-release fertilizer blends and coating technologies. HortTechnology 27:639–643.
Ingram, D.L., C.R. Hall. and J. Knight. Comparison of three production scenarios for *Buxus microphylla* var. japonica 'Green Beauty' marketed in a #3 container on the West Coast using life cycle assessment. HortScience 52:357–365.
Ingram, D.L., C.R. Hall, and J. Knight. Modeling global warming potential, variable costs, and water use of young plant production system components using life cycle assessment. HortScience 52:1356–1361.
Li, T., Y. Zhang, D. Wang, Y. Liu, L.M.A. Dirk, J. Goodman, A.B. Downie, J. Wang, G. Wang, and T. Zhao. Regulation of seed vigor by manipulation of raffinose family oligosaccharides (RFOs) in maize and Arabidopsis. Molecular Plant 10(12):1540–1555. Published online: doi:10.1016/j.molp.2017.10.014.
Manoj, M., W. Shuiqin, S. Louai, G. Derek, L. Dirk, J. Chappell, A.G. Hunt, R. Vierstra, and A.B. Downie. A misannotated locus positively influencing Arabidopsis seed germination is deconvoluted using multiple methods, including surrogate splicing. Plant Gene 10:74–85.
Nambuthiri, S., E. Hagen, A. Fulcher, and R.L. Geneve. Evaluating a physiological-based, on-demand irrigation system for container-grown woody plants with different water requirements. HortScience 52:251–257.
Pook, V., M. Nair, K. Ryu, K. Schrick, J. Scheifelbein, and S. DeBolt. The UDP-Glc:sterol glycosyltransferase gene, UGT80B1, plays a vital role in root epidermal cell patterning in Arabidopsis. Scientific Reports 7:5714.
Santos, J.F., L.M.A. Dirk, A.B. Downie, M.F.G. Sanches, and R.D. Vieira. Soluble sugars, storage proteins, and reciprocal effect of parental lines of corn hybrid seeds. Seed Science Research 27:206–216.
Skidmore, A., N. Wilson, M. Williams, and R. Bessin. The impact of tillage regime and row cover use on insect pests and yield in organic cucurbit production. Renewable Agriculture and Food Systems. Published online: doi:10.1017/S1742170517000503.

Kentucky Tobacco Research and Development Center

Fan, Y., J. Liu, S. Lyu, Q. Wang, S. Yang, and H. Zhu. The soybean Rfg1 gene restricts nodulation by *Sinorhizobium fredii* USDA193. Frontiers in Plant Science 8:1548.
Feller, A, L. Yuan, and E. Grotewold. The BIF domain in plant bHLH proteins is an ACT-like domain. Plant Cell 29(8):1800–1802.
Harlow, B., J. Goodman, B. Lynn, M. Flythe, H. Ji; and G. Aiken. Ruminal tryptophan-utilizing bacteria degrade ergovaline from tall fescue seed extract. Journal of Animal Science 95:980–988. Published online: doi:10.2527/jas2016.1128.
Schluttenhofer, C.M., and L. Yuan. Challenges towards revitalizing hemp: A multifaceted crop. Trends in Plant Science 22(11):917–929.
Shen, E.M., S. Singh, J.S. Ghosh, B. Patra, P. Paul, L. Yuan, and S. Pattanaik. The miRNAome of *Catharanthus roseus*: Identification, expression analysis, and potential roles of microRNAs in regulation of terpenoid indole alkaloid biosynthesis. Scientific Reports 7:43027.
Soorni, A., D. Haak, D. Zaitlin, and A. Bombarely. Organelle_PBA, a pipeline for assembling chloroplast and mitochondrial genomes from PacBio DNA sequencing data. BMC Genomics 18:49.
Wang, J., S.K. Singh, C. Du, C. Li, J. Fan, S. Pattanaik, and L. Yuan. 2016. Comparative transcriptomic analysis of two *Brassica napus* near-isogenic lines reveals a network of genes that influences seed oil accumulation. Frontiers in Plant Science 7:1498.

Landscape Architecture

Keane, T.D., and C.K. Sass. Channel evolution models as predictors of sediment yield. Journal of American Water Resources 53(6):1513–1529. Published online: doi:10.1111/1752-1688.12598.
Li, M.-H., N. Crankshaw, B. Davis, K. Douglas, R. Hewitt, and K. Pritchard. Recent transition of several landscape architecture undergraduate programs from five to four years in the United States. Landscape Architecture 3:115–122. Published online: http://en.cnki.com.cn/Article_en/CJFDTotal-FJYL201703016.htm.
Penn, H.J., K.J. Athey, and B. Lee. Land cover diversity increases predator aggregation and consumption of prey. Ecology Letters 20(5):609–618. Published online: doi:10.1111/ele.12759.

Plant and Soil Sciences

Akinyemi, O., G. Bruckner, J. Johnson, T.A. Lennie, and D. Hildebrand. A rapid and simple method for fatty acid profiling and determination of ω-3 index in red blood cells. The Open Nutrition Journal 11:3–13.
Arndt, A.D., E.K. Oostveen, J. Triplett, D.A. Butterfield, J. Cai, J.B. Klein, O.V. Tsyusko, B.E. Collin, D.L. Starnes, R. Nass, and J.M. Unrine. The role of charge in the toxicity of polymer-coated cerium oxide nanomaterials to *Caenorhabditis elegans*. Comparative Biochemistry and Physiology Part C 201:1–10.
Barrett, M., D.E. Ervin, G.B. Frisvold, R.A. Jussaume, D.R. Shaw, and S.M. Ward. A wicked view. Weed Science 65:441–443.
Baskin, J.M., and C.C. Baskin. Seed germination in Cleistogamous species: Theoretical considerations and a literature survey of experimental results. Seed Science Research 27:84–98.
Biederman, L.A., B. Mortensen, P.A. Fay, N. Hagenah, J. Knops, K. La Pierre, R. Laungani, E. Lind, R.L. McCulley, S. Power, E.W. Seabloom, and P. Tognetti. Nutrient addition shifts plant community composition towards earlier flowering species in some prairie ecoregions in the U.S. Central Plains. PLOS ONE. Published online: doi:10.1371/journal.pone.0178440.
Billman, E., B.M. Goff, B. Baldwin, K. Prince, and T.D. Phillips. Effects of vegetative cool-season grasses on forage removal by dairy cattle. Agronomy Journal 109(4):1–11.
Bowman, J.L., T. Kohchi, K.T. Yamato, J. Jenkins, S. Shu, K. Ishizaki, S. Yamaoka, R. Nishihama, Y. Nakamura, F. Berger, et al. Insights into land plant evolution garnered from the *Marchantia polymorpha* genome. Cell 171:287–304.
Chen, C., O.V. Tsyusko, D.H. McNear, Jr., J. Judy, R.W. Lewis, and J.M. Unrine. Effects of biosolids from a wastewater treatment plant receiving manufactured nanomaterials on *Medicago truncatula* and associated soil microbial communities at low concentrations. Science of the Total Environment 609:799–806.
Clark, A.J., D. Sarti-Dvorjak, G. Brown-Guedira, Y. Dong, B.K. Baik, and D.A. Van Sanford (2016). Identifying rare FHB resistant transgressive segregants in intransigent backcross and F2 winter wheat populations. Frontiers in Microbiology 7:277. Published online: doi:10.3389/fmicb.2016.00277.
Coyne, M.S., and R. Wen. Managing nitrous oxide emissions in agricultural fields. Plant and Soil Sciences Research Reports 6(1). Published online: doi:10.13023/PSSRR.2017.1.
Cropper, K.L., G.C. Munshaw, and M. Barrett. Optimum seasonal mowing heights for large crabgrass (*Digitaria sanquinalis*) reduction. HortTechnology 27:73–77.
Cropper, K.L., G.C. Munshaw, J.S. Beasley, and M. Barrett. Chemical control of *Sorghum halepense* in home lawns across two different mowing heights. International Turfgrass Society Research Journal 13:731–733. Published online: doi:10.2134/itsrj2016.10.0846.
Dangal, S.R.S., H. Tian, C. Lu, W. Ren, S. Pan, J. Yang, N. Di Cosmo, and A. Hessl. Integrating herbivore population dynamics into a global land biosphere model: Plugging animals into the earth system. Journal of Advances in Modeling Earth Systems 9:2920–2945. Published online: doi:10.1002/2016MS000904.
das Neves, H.H., M.G. Ferreira da Mata, M. Guerra, J. Guilherme, D.F. de Carvalho, O. Wendroth, and M.B. Ceddia. Spatial and temporal patterns of soil water content in an agroecological production system. Scientia Agricola 74(5):383–392.
de Lorenzo, L., R. Sorenson, J. Bailey-Serres, and A.G. Hunt. Noncanonical alternative polyadenylation contributes to gene regulation in response to hypoxia. The Plant Cell 29:1262–1277.
Dörner, J., R. Horn, D. Dec, O. Wendroth, H. Fleige, and F. Zunigaugalde. Land-use-dependent change in the soil mechanical strength and resilience of a shallow volcanic ash soil in southern Chile. Soil Science Society of American Journal 81:1064–1073.
Fan, S., C.C. Baskin, J.M. Baskin, and Y.R. Wang. The seed ecology of *Agriophyllum squarrosum*, a pioneer sand dune annual in Central Asia, with particular reference to seed germination. Seed Science Research 27:165–173.
Fan, Y., J. Liu, S. Lyu, Q. Wang, S. Yang, and H. Zhu. The soybean Rfg1 gene restricts nodulation by *Sinorhizobium fredii* USDA193. Frontiers in Plant Science. Published online: doi:10.3389/fpls.2017.01548.
Feller, A., L. Yuan, and E. Grotewold. The BIF domain in plant bHLH proteins is an ACT-like domain. Plant Cell 29(8):1800–1802.
Fiorellino, N.M., J.M. McGrath, P.A. Vadas, C.H. Bolster, and F.J. Coale. Use of annual phosphorus loss estimator (APLE) model to evaluate a phosphorus index. Journal of Environmental Quality. Published online: doi:10.2134/jeq2016.05.0203.
Fogliani, B., G. Gateblé, M. Villegente, I. Fabre, N. Klein, N. Anger, C.C. Baskin, and C. Scott. The morphophysiological dormancy in *Amborella trichopoda* seeds is a pleisiomorphic trait in angiosperms. Annals of Botany 119:581–590.
Gill, J.R., P.S. Burks, S.A. Staggenborg, G.N. Odvody, R.W. Heiniger, B. Macoon, K.J. Moore, M. Barrett, and W.L. Rooney (2016). Yield results and stability analysis from the sorghum regional biomass feedstock trial. BioEnergy Research 7(3):1026–1034.
Guo, H., X. Zhao, E.N. Rosskopf, F. DiGioia, J.C. Hong, and D.H. McNear, Jr. Impacts of anaerobic soil disinfestation and chemical fumigation on soil microbial communities in field tomato production system. Applied

Soil Ecology. Published online: doi:10.1015/j.apsoil.2017.12.018.
Haramoto, E.R., and D.C. Brainard. Spatial and temporal variability in Powell amaranth (*Amaranthus powellii*) emergence under strip tillage with cover crop residue. Weed Science 65:151–163.
Hautier, Y., I. Forest, E.T. Borer, E.W. Seabloom, W.S. Harpole, E.M. Lind, A.S. MacDougall, C.J. Stevens, P.B. Adler, J. Alberti, et al. Local loss and spatial homogenization of plant diversity reduce ecosystem multifunctionality. Nature Ecology and Evolution. Published online: doi:10.1038/s41559-017-0395-0.
Heydari, M., R. Omidipour, M. Abedi, and C.C. Baskin. Effects of fire disturbance on alpha and beta diversity and on beta diversity components of soil seed banks and aboveground vegetation. Plant Ecology and Evolution 150(3):247–256.
Hitz, K., A. Clark, and D. Van Sanford (2016). Identifying nitrogen-use efficient soft red winter wheat lines in high and low nitrogen environments. Field Crops Research 200:1–9. Published online: doi:10.1016/j.fcr.2016.10.001.
Hood, M.M., R.K. Taggart, R.C. Smith, H. Hsu-Kim, K.R. Henke, U. Graham, J.G. Groppo, J.M. Unrine, and J.C. Hower. Rare earth element distribution in fly ash derived from the Fire Clay coal, Kentucky. Coal Combustion and Gasification Production 9:22-33.
Hu, X.W., R. Zhang, Y.P. Wu, and C.C. Baskin. Seedling tolerance to cotyledon removal varies with seed size: A case of five legume species. Ecology and Evolution 7:5948–5955.
Hu, X.W., J. Pan, D.D. Min, Y. Fan, X.Y. Ding, S.G. Fan, C.C. Baskin, and J.M. Baskin. Seed dormancy and soil seed bank of the invasive weed *Chenopodium hybridum* in northwestern China. Weed Research 57:54–64.
Huang, W., A.B. Khaldun, J. Chen, C. Zhang, H. Lv, L. Yuan, and Y. Wang (2016). A R2R3-MYB transcription factor regulates the flavonol biosynthetic pathway in a traditional Chinese medicinal plant, *Epimedium sagittatum*. Frontiers in Plant Science 7:1089. Published online: doi:10.3389/fpls.2016.01089.
Jin, N., B. Tao, W. Ren, M. Feng, R. Sun, L. He, W. Zhang, and Q. Yu. Mapping irrigated and rainfed wheat areas using multi-temporal satellite data. Remote Sensing 8(3):207.
Kagan, I.A., L.M. Lawrence, D.H. Seman, K.J. Prince, A.L. Fowler, and S.R. Smith. Effects of sampling time, cultivar, and methodology on water- and ethanol-soluble carbohydrate profiles of three cool-season grasses in central Kentucky. Journal of Equine Veterinary Science 61:99–107. Published online: doi:10.1016/j.jevs.2017.11.011.
Kreba, S., O. Wendroth, M.S. Coyne, and J. Walton. Soil gas diffusivity, air-filled porosity, and pore continuity: Land use and spatial patterns. Soil Science Society of America Journal 81:477–489. Published online: doi:10.2136/sssaj2016.10.0344.
Lahive, E., M. Matzke, M. Durenkamp, A. Lawlor, S. Thacker, M. Pereira, D. Spurgeon, J.M. Unrine, C. Svendsen, and S. Lofts. Sewage sludge treated with metal nanomaterials inhibits earthworm reproduction more strongly than sludge treated with metal metals in bulk/salt forms. Environmental Science: Nano 4(1):78–88.
Laurent, T.E., R.C. Graham, B.D. Lee, and W. Tripp. Elemental content of mineral licks in the Klamath Mountains, Siskiyou County, California. California Fish and Game 103(1):27–38.
Legleiter, T., B. Young, and W. Johnson. Glyphosate plus 2,4-D deposition, absorption, and efficacy on glyphosate-resistant weed species as influenced by broadcast spray nozzle. Weed Technology 32(2):141–149. Published online: doi:10.1017/wet.2017.88.
Legleiter, T., B. Young, and W. Johnson. Influence of broadcast spray nozzle on the deposition, absorption, and efficacy of Dicamba plus glyphosate on four glyphosate-resistant dicot weed species. Weed Technology 32(2)174–181. Published online: doi:10.1017/wet.2017.104.
Lewis, R.W., J.M. Unrine, P.M. Bertsch, and D.H. McNear, Jr. Silver engineered nanomaterials and ions elicit species-specific O_2 consumption responses in plant growth promoting rhizobacteria. Biointerphases 12(5):05G604. Published online: doi:10.1116/1.4995605.
Li, R., L. Chen, Y. Wu, R. Zhang, C.C. Baskin, J.M. Baskin, and X. Hu. Effects of cultivar and maternal environment on seed quality in *Vicia sativa* Front. Plant Science 8:1411. Published online: doi:10.3389/fpls.2017.01411.
Liu, H.L., B. Abudureheman, L.W. Zhang, J.M. Baskin, C.C. Baskin, and D.Y. Zhang. Seed dormancy-breaking in a cold desert shrub in relation to sand temperature and moisture. AoB Plants 9(1):plx003. Published online: doi:10.1093/aobpla/plx003.
Liu, S., M.S. Coyne, and J.H. Grove. Long-term tillage and nitrogen fertilization: Consequences for nitrifier density and activity. Applied Soil Ecology 120:121–127. Published online: doi:10.1016/j.apsoil.2017.07.034.
Lu, J.J., D.Y. Tan, C.C. Baskin, and J.M. Baskin. Effect of seed position on parental plant on proportion of seeds produced with nondeep and intermediate physiological dormancy. Frontiers in Plant Science 8:147. Published online: doi:10.3389/fpls.2017.00147.
Lu, J.J., D.Y. Tan, C.C. Baskin, and J.M. Baskin. Role of indehiscent pericarp in 519: Formation of soil seed bank in five cold desert Brassicaceae species. Plant Ecology 218:1187–1200.
Ma, M., C.C. Baskin, K. Yu, Z. Ma, and G. Du. Wetland drying indirectly influences plant community and seed bank diversity through soil pH. Ecological Indicators 80:186–195.
Mack, L., F. Capezzone, S. Munz, H. Piepho, W. Claupein, T. Phillips, and S. Graeff-Hönninger. Nondestructive leaf area estimation for chia. Agronomy Journal 109(5):1960–1969. Published online: doi:10.2134/agronj2017.03.0149.
Menga, V., M. Amato, T.D. Phillips, D. Angelino, Fe. Morreale, and C. Fares. Gluten-free pasta incorporating chia (*Salvia hispanica* L.) as thickening agent: An approach to naturally improve the nutritional profile and the in vitro carbohydrate digestibility. Food Chemistry 221:1954–1961.
Miller, J.O., S. Dill, J. Rhodes, N. Fiorellino, and J. McGrath. An annual precision agriculture field day on the Delmarva. Journal of the NACAA 9(1). Published online: www.nacaa.com/journal/index.php?jid=600.
Mubiru, D.N., J. Namakula, J. Lwasa, G. A. Otim, J. Kashagama, M. Nakafeero, W. Nanyeenya, and M. S. Coyne. Conservation farming tillage methods are more beneficial than conventional methods on degraded Ugandan soils. Sustainability 9(7):1084–1098. Published online: doi:10.3390/su9071084.
Munshaw, G.C., J.S. Beasley, C.M. Baldwin, J.Q. Moss, K.L. Cropper, H.W. Philley, C.A. Segars, and B.R. Stewart. Nitrogen and sprigging rate effects on 'Latitude 36' hybrid bermudagrass establishment. HortTechnology 27(3):382–385.
Munshaw, G.C., K.H. Dickson, K.L. Cropper, and J.C. Sorochan. The effect of fraze mowing on overseed establishment in *Cynodon dactylon* turf. International Turf Society Research Journal 13:1–3.
Orlowski, J.M., W.R. Serson, M. Al-Amery, G.L. Gregg, and C.D. Lee. Early-season stress can have small effect on soybean seed protein and oil content. Crop Forage Turfgrass Management. Published online: doi:10.2134/cftm2016.12.0082.
Pan, S., G. Chen, W. Ren, S.R.S. Dangal, K. Banger, J. Yang, B. Tao, and H. Tian. Responses of global terrestrial water use efficiency to climate change and rising atmospheric CO_2 concentration in the twenty-first century. International Journal of Digital Earth. Published online: doi:10.1080/17538947.2017.1337818.
Paul, P., S. Singh, B. Patra, X. Sui, S. Pattanaik, and L. Yuan. A differentially regulated AP2/ERF transcription factor gene cluster acts downstream of a MAP kinase cascade to modulate terpenoid indole alkaloid biosynthesis in *Catharanthus roseus*. New Phytologist 213(3):1107–1123.
Pena-Yewtukhiw, E.M., E.L. Romano, N.L. Waterland, and J.H. Grove. Soil health indicators during transition from row crops to grass/legume sod. Soil Science Society of America Journal 81:1486–1495. Published online: doi:10:2136/sssaj2016.12.0439.
Penn, C., J. Bowen, J.M. McGrath, R. Nairn, G. Fox, G. Brown, S. Wilson, and C. Gill (2016). Evaluation of a universal flow-through model for predicting and designing phosphorus removal structures. Chemosphere 151:345–355.
Ramzani, P.M.A, M.S. Coyne, S. Anjum, W.u.D. Khan, and M. Iqbal. In situ immobilization of Cd by organic amendments and their effect on antioxidant enzyme defense mechanism in mung bean (*Vigna radiata* L.) seedlings. Plant Physiology and Biochemistry 118:561–570.
Riaz, L., T. Mahmood, M.S. Coyne, A. Khalid, A. Rashid, M.T. Hayat, A. Gulzar, and M. Amjad. Physiological and antioxidant responses of wheat seedlings to fluoroquinolone antibiotics. Chemosphere 177:250–257.
Richmond, M.D., R.C. Pearce, and W.A. Bailey (2016). Dark fire-cured tobacco response to potassium rate and application method. Tobacco Science 53:12–15.
Richmond, M.D., R.C. Pearce, B.M. Goff, and W.A. Bailey. Analysis of variability in curing conditions and tobacco-specific nitrosamines within barns of dark air-cured tobacco. Tobacco Science 54(1):6–14. Published online: doi:10.3381/17-060.
Rodrigues, S.M., P. Demokritou, N. Dokoozlian, C.O. Hendren, B. Karn, M.S. Mauter, O.A. Sadik, M. Safarpour, J.M. Unrine, and J. Viers. Nanotechnology for sustainable food production: Promising opportunities and scientific challenges. Environmental Science: Nano 4(4):767–781.
Romano, E.L., E.M. Pena-Yewtukhiw, N.L. Waterland, and J.H. Grove. Soil health benefit to composted manure application and insertion of a sod component in a long-term organic crop rotation. Soil Science 182(4):137–145. Published online: doi:10.1097/SS0000000000000205.
Rubio de Casas, R., C. Willis, W. Pearse, C.C. Baskin, J.M. Baskin, and J. Cavender-Bares. Global biogeography of seed dormancy is determined by seasonality and seed size: A case study in the legumes. New Phytologist 214:1527–1536.

Russell, K., C. Lee, and D. Van Sanford. Interaction of genetics, environment, and management in determining soft red winter wheat yields. Agronomy Journal 109:2463–2473. Published online: doi:10.2134/agronj2017.02.0126.

Salmerón, M., L.C. Purcell, E.D. Vories, and G. Shannon (2016). Simulation of genotype-by-environment interactions on irrigated soybean yields in the U.S. Midsouth. Agricultural Systems 150:120–129. Published online: doi:10.1016/j.agsy.2016.10.008.

Schluttenhofer, C.M., and L. Yuan. Challenges towards revitalizing hemp: A multifaceted crop. Trends in Plant Science 22(11):917–929.

Shen, E.M., S. Singh, J.S. Ghosh, B. Patra, P. Paul, L. Yuan, and S. Pattanaik. The miRNAome of *Catharanthus roseus*: Identification, expression analysis, and potential roles of microRNAs in regulation of terpenoid indole alkaloid biosynthesis. Scientific Reports 7:43027.

Shober, A.L., A.R. Buda, K.C. Turner, N.M. Fiorellino, A.S. Andres, J.M. McGrath, and J. Thomas Sims. Assessing coastal plain risk indices for subsurface phosphorus loss. Journal of Environmental Quality 46(6):1270–1286. Published online: doi:10.2134/jeq2017.03.0102.

Soltani, E., C.C. Baskin, and J.M. Baskin. A graphical method for identifying the six types of nondeep physiological dormancy in seeds. Plant Biology 19:673–682.

Spielman-Sun, E., E. Lombi, E. Donner, D.L. Howard, J.M. Unrine, and G.V. Lowry. Impact of surface charge on cerium oxide nanoparticle uptake and translocation by wheat (*Triticum aestivum*). Environmental Science and Technology 51(13):7361–7368.

Syed, Z., D. Alexander, J. Ali, J.M. Unrine, and W.A. Shoults-Wilson. Chemosensory cues alter earthworm (*Eisenia fetida*) avoidance of lead-contaminated soil. Environmental Toxicology and Chemistry 36(4):999–1004.

Uda, K., K. Abe, Y. Dehara, K. Mizobata, Y. Edashige, R. Nishimura, A.D. Radkov, and L.A. Moe. Triple serine loop region regulates the aspartate racemase activity of the serine/aspartate racemase family. Amino Acids 49(10):1743–1754. Published online: doi:10.1007/s00726-017-2472-8.

Wang, G., X. Ye, C.C. Baskin, J.M. Baskin, X. Yang, G. Liu, X. Zhang, and Z. Huang. Timing of seed germination in two alpine herbs on the southeastern Tibetan Plateau: The role of seed dormancy and annual dormancy cycling. Plant and Soil 421:465–476.

Wang, J., J.M. Baskin, C.C. Baskin, G. Liu, X. Yang, and Z. Huang. Seed dormancy and germination of the medicinal holoparasitic plant *Cistanche deserticola* from the cold desert of Northwest China. Plant Physiology and Biochemistry 115:279–285.

Wang, J.X., J. Nie, S. Pattanaik, and L. Yuan (2016). Efficient agrobacterium-mediated transformation of *Artemisia annua* L. using young inflorescence. In Vitro Cellular and Developmental Biology: Plant 52(2):204–211.

Wang, J.X., S.K. Singh, C. Du, C. Li, F. Fan, S. Sitakanta Pattanaik, and L. Yuan (2016). Comparative transcriptomic analysis of two *Brassica napus* near-isogenic lines reveals a network of genes that influences seed oil accumulation. Frontiers in Plant Science 7:1498.

Wang, Q., S. Yang, J. Liu, K. Terecskei, E. Ábrahám, A. Gombár, Á. Domonkos, A. Szűcs, P. Körmöczi, T. Wang, et al. Host-secreted antimicrobial peptide enforces symbiotic selectivity in *Medicago truncatula*. Proceedings, National Academy of Sciences USA 114(26):6854–6859. Published online: doi:10.1073/pnas.1700715114.

Wang, Q., J. Liu, H. Li, S. Yang, P. Körmöczi, A. Kereszt, and H. Zhu. Nodule-specific cysteine-rich peptides negatively regulate nitrogen-fixing symbiosis in a strain-specific manner in *Medicago truncatula*. Molecular Plant-Microbe Interactions 31(2):240–248. Published online: doi:10.1094/MPMI-08-17-0207-R.

Xu, Z., K. Cheng, X. Li, J. Yang, S. Xu, X. Cao, X. Hu, W. Xie, L. Yuan, M. Ambrose, et al. (2016). Transcriptional and post-transcriptional modulation of SQU and KEW activities in the control of dorsal-ventral asymmetric flower development in *Lotus japonicus*. Molecular Plant 9(5):722–736.

Yang, F., J.M. Baskin, C.C. Baskin, X. Yang, D. Cao, and Z. Huang. Divergence in life history traits between two populations of a seed-dimorphic halophyte in response to soil salinity. Frontiers in Plant Science 8:1028. Published online: doi:10.3389/fpls.2017.01028.

Yang, S., Q. Wang, E. Fedorova, J. Liu, Q. Qin, Q. Zheng, P.A. Price, H. Pan, D. Wang, J.S. Griffitts, T. Bisseling, and H. Zhu. Microsymbiont discrimination mediated by a host-secreted peptide in *Medicago truncatula*. Proceedings, National Academy of Science USA 114(26):6848–6853.

Yokel, R.A., and J.M. Unrine. Aluminum and phthalates in calcium gluconate: Contribution from glass and plastic packaging. Journal of Pediatric Gastroenterology and Nutrition 64(1):109–114.

Yokel, R.A., S.E. Seger, and J.M. Unrine. Toxic and essential trace element content of commonly administered pediatric oral medications. The Journal of Pediatric Pharmacology and Therapeutics 22(3):193–202.

Zhang, C., and W. Ren. Complex climatic and CO_2 controls on net primary productivity of temperate dryland ecosystems over central Asia during 1980–2014. Journal of Geophysical Research: Biogeosciences 122(9):2356–2374. Published online: doi:10.1002/2017JG003781.

Zhang, J., P. An, J. Yang, W. Ren, Z. Pan, Z. Dong, G. Han, S. Pan, Y. Pan, and H. Tian. Enhancing soil drought induced by climate change and agricultural practices: Observational and experimental evidence from the semiarid area of northern China. Agricultural and Forest Meteorology 243:74–83.

Zhang, K., J.M. Baskin, C.C. Baskin, X. Yang, and Z. Huang. Effect of seed morph and light level on growth and reproduction of the amphicarpic plant *Amphicarpaea edgeworthii* (*Fabaceae*). Scientific Reports 7:39886. Published online: doi:10.1038/srep39886.

Zhang, R., J.M. Baskin, C.C. Baskin, Q. Mo, L. Chen, X.W. Hu, and Y. Wang. Effect of population, collection year, after-ripening, and incubation conditions on seed germination of *Stipa bungeana*. Scientific Reports 7:13893. Published online: doi:10.1038/s41598-017-14267-2.

Zhang, R., X. Hu, J.M. Baskin, C.C. Baskin, and Y. Wang. Effects of litter on seedling emergence and seed persistence of three common species on the Loess Plateau in northwestern China. Frontiers in Plant Science 8:103. Published online: doi:10.3389/fpls.2017.00103.

Zhao, X., C.C. Baskin, C. Zhu, and J.M. Baskin. Fruit dispersal dynamics of the cold desert shrub *Zygophyllum xanthoxylon*. Seed Science Research 27:303–310.

Zhou, R., K. Basu, H. Hartman, C.J. Matocha, S.K. Sears, H. Vali, and M.I. Guzman. Catalyzed synthesis of zinc clays by prebiotic central metabolites. Scientific Reports 7:533. Published online: doi:10.1038/s41598-017-00558-1.

Zhu, X., X. Qiu, Y. Zeng, W. Ren, B. Tao, H. Pan, T. Gao, and J. Gao. High-resolution precipitation downscaling in mountainous areas over China: Development and application of a statistical mapping approach. International Journal of Climatology 38(1):77–93. Published online: doi:10.1002/joc.5162.

Zou, C., R.C. Pearce, J.H. Grove, and M.S. Coyne. Laboratory vs. in situ resin-core methods to estimate net nitrogen mineralization for comparison of rotation and tillage practices. Plant Nutrition and Soil Science 180(3):294–301. Published online: doi:10.1002/jpln.201600571.

Zou, C., R.C. Pearce, J.H. Grove, and M.S. Coyne. No-tillage culture and nitrogen fertilizer management for burley tobacco production. Journal of Agricultural Science (Cambridge) 155:599–612. Published online: doi:10.1017/S0021859616000733.

Michael Barrett contributed to one publication in Horticulture.

Mark Coyne contributed to one publication in Biosystems and Agricultural Engineering.

David Hildebrand contributed to one publication in Horticulture.

Arthur Hunt contributed to one publication in Horticulture.

Luke Moe contributed to one publication in Kentucky Tobacco Research and Development Center.

Gregg Munshaw contributed to one publication in Plant Pathology.

Lloyd Murdock contributed to one publication in Plant Pathology.

Sharyn Perry contributed to one publication in Agricultural Economics.

Todd Pfeiffer contributed to one publication in Plant Pathology.

Ole Wendroth contributed to one publication in Biosystems and Agricultural Engineering.

David Williams contributed to one publication in Biosystems and Agricultural Engineering.

Plant Pathology

Ajayi-Oyetunde, O.O., C.J. Butts-Wilmsmeyer, and C.A. Bradley. Identification and characterization of *Rhizoctonia* species associated with soybean seedling disease. Plant Disease 101:520–533.

Ajayi-Oyetunde, O.O., C.J. Butts-Wilmsmeyer, and C.A. Bradley. Sensitivity of *Rhizoctonia solani* to succinate dehydrogenase inhibitor and demethylation inhibitor fungicides. Plant Disease 101:487–495.

Amsden, B., K. Kwiatkowski, E. Dixon, T. Thompson, M. Williams, J. Beale, and E. Pfeufer. First report of downy mildew caused by *Hyaloperonospora parasitica* on Siberian kale in Kentucky. Plant Disease 101:1057–1057. Published online: doi:10.1094/pdis-05-16-0721-pdn.

Anderson, N.R., M.D. Irizarry, C.A. Bloomingdale, D.L. Smith, C.A. Bradley, D.P. Delaney, N.M. Kleczewski, E.J. Sikora, D.S. Mueller, and K.A. Wise. Effect of soybean vein necrosis on yield and seed quality of soybean. Canadian Journal of Plant Pathology 39:334–341.

Buiate, E.A.S., K.V. Xavier, N. Moore, M.F. Torres, M.L. Farman, C.L. Schardl, and L.J. Vaillancourt. A comparative genomic analysis of putative pathogenicity genes in the host-specific sibling species *Colletotrichum graminicola* and *Colletotrichum sublineola*. BMC Genomics 18:67. Published online: doi:10.1186/s12864-016-3457-9.

Chuang, C.K., K.R. Prasanth, and P.D. Nagy. The glycolytic pyruvate kinase is recruited directly into the viral replicase complex to generate ATP for RNA synthesis. Cell Host & Microbe 22:639. Published online: doi:10.1016/j.chom.2017.10.004.

Cook, D., B.G.G. Donzelli, R. Creamer, D.L. Baucom, D.R. Gardner, J. Pan, N. Moore, S.B. Krasnoff, J.W. Jaromczyk, and C.L. Schardl. Swainsonine biosynthesis genes in diverse symbiotic and pathogenic fungi. G3: Genes-Genomes-Genetics 7:1791–1797. Published online: doi:10.1534/g3.117.041384.

de Castro, I.F., J.J. Fernandez, D. Barajas, P.D. Nagy, and C. Risco. Three-dimensional imaging of the intracellular assembly of a functional viral RNA replicase complex. Journal of Cell Science 130:260–268. Published online: doi:10.1242/jcs.181586.

Dietzgen, R.G., H. Kondo, M.M. Goodin, G. Kurath, and N. Vasilakis. The family *Rhabdoviridae*: Mono- and bipartite negative-sense RNA viruses with diverse genome organization and common evolutionary origins. Virus Research 227:158–170. Published online: doi:10.1016/j.virusres.2016.10.010.

Dinkins, R.D., P. Nagabhyru, M.A. Graham, D. Boykin, and C.L. Schardl. Transcriptome response of *Lolium arundinaceum* to its fungal endophyte *Epichloë coenophiala*. New Phytologist 213:324–337. Published online: doi:10.1111/nph.14103.

Farman, M., G. Peterson, L. Chen, J. Starnes, B. Valent, P. Bachi, L. Murdock, D. Hershman, K. Pedley, J.M. Fernandes, and J. Bavaresco. The Lolium pathotype of *Magnaporthe oryzae* recovered from a single blasted wheat plant in the United States. Plant Disease 101:684–692. Published online: doi:10.1094/pdis-05-16-0700-re.

Florea, S., D.G. Panaccione, and C.L. Schardl. Ergot alkaloids of the family Clavicipitaceae. Phytopathology 107:504–518. Published online: doi:10.1094/phyto-12-16-0435-rvw.

Fulcher, A., A. LeBude, S.A. White, M.R. Chappell, S.C. Marble, J.H. Chong, W. Dunwell, F. Hale, W. Klingeman, G. Knox, et al. Advancing integrated pest management adoption and achieving extension impact: A working group success story. HortTechnology 27:759–764. Published online: doi:10.21273/horttech03755-17.

Inoue, Y., T.T.P. Vy, K. Yoshida, H. Asano, C. Mitsuoka, S. Asuke, V.L. Anh, C.J.R. Cumagun, I. Chuma, R. Terauchi, et al. Evolution of the wheat blast fungus through functional losses in a host specificity determinant. Science 357:80–83. Published online: https://science.sciencemag.org/content/357/6346/80.full.

Jang, C.Y., R.Y. Wang, J. Wells, F. Leon, M. Farman, J. Hammond, and M.M. Goodin. Genome sequence variation in the Constricta strain dramatically alters the protein interaction and localization map of potato yellow dwarf virus. Journal of General Virology 98:1526. Published online: doi:10.1099/jgv.0.000771.

Kachroo, A., P. Vincelli, and P. Kachroo. Signaling mechanisms underlying resistance responses: What have we learned, and how is it being applied? Phytopathology 107:1452–1461. Published online: doi:10.1094/phyto-04-17-0130-rvw.

Kandel, Y.R., K.A. Wise, C.A. Bradley, M.I Chilvers, A.M. Byrne, A.U. Tenuta, J. Faghihi, S. Wiggs, and D.S. Mueller. Effect of soybean cyst nematode resistance source and seed treatment on population densities of *Heterodera glycines*, sudden death syndrome, and yield of soybean. Plant Disease 101:2137–2143.

Kovalev, N., J. Inaba, Z.H. Li, and P.D. Nagy. The role of co-opted ESCRT proteins and lipid factors in protection of tombusviral double-stranded RNA replication intermediate against reconstituted RNAi in yeast. PLoS Pathogens 13:26. Published online: doi:10.1371/journal.ppat.1006520.

LeBude, A., A. Fulcher, J.J. Dubois, S.K. Braman, M. Chappell, J.H. Chong, J. Derr, N. Gauthier, F. Hale, W. Klingeman, et al. Experiential nursery integrated pest management workshop series to enhance grower practice adoption. HortTechnology 27:772–781. Published online: doi:10.21273/horttech03765-17.

Liu, J., P. Nagabhyru, and C.L. Schardl. *Epichloë festucae* endophytic growth in florets, seeds, and seedlings of perennial ryegrass (*Lolium perenne*). Mycologia 109:691–700. Published online: doi:10.1080/00275514.2017.1400305.

Nagy, P.D. Exploitation of a surrogate host, *Saccharomyces cerevisiae*, to identify cellular targets and develop novel antiviral approaches. Current Opinion in Virology 26:132–140. Published online: doi:10.1016/j.coviro.2017.07.031.

Pieck, M.L., A. Ruck, M.L. Farman, G.L. Peterson, J.P. Stack, B. Valent, and K.F. Pedley. Genomics-based marker discovery and diagnostic assay development for wheat blast. Plant Disease 101:103–109. Published online: doi:10.1094/pdis-04-16-0500-re.

Prasanth, K.R., C.K. Chuang, and P.D. Nagy. Co-opting ATP-generating glycolytic enzyme PGK1 phosphoglycerate kinase facilitates the assembly of viral replicase complexes. PLoS Pathogens 13:19. Published online: doi:10.1371/journal.ppat.1006689.

Rojas, J.A., J. Jacobs, S. Napieralski, B. Karaj, C.A. Bradley, T. Chase, P. Esker, L. Giesler, D. Jardine, D. Malvick, et al. Oomycete species associated with soybean seedlings in North America–Part I: Identification and pathogenicity characterization. Phytopathology 107:280–292.

Rojas, J.A., J. Jacobs, S. Napieralski, B. Karaj, C.A. Bradley, T. Chase, P. Esker, L. Giesler, D. Jardine, D. Malvick, et al. Oomycete species associated with soybean seedlings in North America–Part II: Diversity and ecology in relation to environmental and edaphic factors. Phytopathology 107:293–304.

Schmid, J., R. Day, N.X. Zhang, P.Y. Dupont, M.P. Cox, C.L. Schardl, N. Minards, M. Truglio, N. Moore, D.R. Harris, and Y.F. Zhou. Host tissue environment directs activities of an *Epichloë* endophyte, while it induces systemic hormone and defense responses in its native perennial ryegrass host. Molecular Plant-Microbe Interactions 30:138–149. Published online: doi:10.1094/mpmi-10-16-0215-r.

Singh, A., G.H. Lim, and P. Kachroo. Transport of chemical signals in systemic acquired resistance. Journal of Integrative Plant Biology 59:336–344. Published online: doi:10.1111/jipb.12537.

Wang, J., C.A. Bradley, O. Stenzel, D.K. Pedersen, U. Reuter-Carlson, and M.I. Chilvers. Baseline sensitivity of *Fusarium virguliforme* to fluopyram fungicide. Plant Disease 101:576–582.

Weems, J.D., and C.A. Bradley. Sensitivity of *Exserohilum turcicum* to demethylation inhibitor fungicides. Crop Protection 99:85–92.

Williams, M., and C.A. Bradley. Fludioxonil + mefenoxam seed treatment improves edamame seedling emergence. HortTechnology 27:846–851.

Xavier, K.V., T. Pfeiffer, D.F. Parreira, S. Chopra, and L. Vaillancourt. Aggressiveness of *Colletotrichum sublineola* strains from *Sorghum bicolor* and *S. halepense* to sweet sorghum variety sugar drip, and their impact on yield. Plant Disease 101:1578–1587. Published online: doi:10.1094/pdis-09-16-1238-re.

Xu, K., and P.D. Nagy. Sterol binding by the tombusviral replication proteins is essential for replication in yeast and plants. Journal of Virology 91. Published online: doi:10.1128/jvi.01984-16.

Zeng, F., C. Wang, G. Zhang, J. Wei, C.A. Bradley, and R. Ming. Draft genome sequence of *Cercospora sojina* S9, a fungus causing frogeye leaf spot (FLS) disease of soybean. Genomics Data 12:79–80.

Zeng, F., X. Lian, G. Zhang, X. Yu, C.A. Bradley, and R. Ming. A comparative genome analysis of *Cercospora sojina* with other members of the pathogen genus *Mycosphaerella* on different plant hosts. Genomics Data 13:54–63.

Zhang, G., and C.A. Bradley. Comparison of quinone outside inhibitor fungicide-resistant and -sensitive isolates of *Cercospora sojina*. Crop Protection 94:59–63.

Retailing and Tourism

Jackson, V., and S. Wesley. Closing the gap between faculty and industry professionals' importance of student soft skill proficiency. The Journal of American Academy of Business 23(1):54–60.

Levitt, J.A., F. Meng, P. Zhang, and R.B. DiPietro. Examining factors influencing food tourist intentions to consume local cuisine. Tourism and Hospitality Research. Published online: doi:10.1177/1467358417742687.

Levitt, J.A., P. Zhang, R.B. DiPietro, and F. Meng. Food tourist segmentation: Attitude, behavioral intentions, and travel planning behavior based on food involvement and motivation. International Journal of Hospitality and Tourism Administration. Published online: doi:10.1080/15256480.2017.1359731.

Li, J., and Y. Lu. A review on international publications on Chinese culture and Chinese tourist behavior. Tourism Tribune 32(9):70–78.

Lu, Y. A model of expectancy motivation for business event tourism: Evidence from China. Event Management 21(4):481–486.

Lu, Y. The concept of loyalty in hospitality and tourism: Theoretical development, practice and future research directions. International Journal of Qualitative Research in Service 2(4):308–324.

Miller-Spillman, K.A., J.-J. Yoo, M-Y Lee, Y. J. Kim, and N. Huffman. Dress and the public, private and secret self model during emerging adulthood. Fashion, Style and Popular Culture 4(3):383–401. Published online: doi:10.1386/fspc.4.3.383_1.

Wei, W., Y. Lu, and Nan Hua. Attendees' user experience of social media technology during multiphase participation in conventions: A consumption values approach. Event Management 21(3):347–364.

Wei, W., Y. Lu, L. Miao, L. Cai, and C-Y. Wang. Customer-customer interactions (CCIs) at conferences: An identity approach. Tourism Management 59(20):154–170.
Wesley, S., V. Jackson, and M. Lee. The perceived importance of core soft skills between retailing and tourism management students, faculty and businesses. Employee Relations 39(1):79–99.

UK Veterinary Diagnostic Laboratory

Carossino, M., A.T. Loynachan, I.F. Canisso, J.R. Campos, B. Nam, Y.Y. Go, E.L. Squires, M.H. Troedsson, R.F. Cook, T. Swerczek, et al. Equine arteritis virus has specific tropism for stromal cells and CD8+ T and CD21+ B lymphocytes but not glandular epithelium at the primary site of persistent infection in the stallion reproductive tract. Journal of Virology 91(13):e00418-17. Published online: doi:10.1128/JVI.00418-17. PMID:28424285.
Carossino, M., B. Wagner, A.T. Loynachan, R.F. Cook, I.F. Canisso, L. Chelvarajan, C.L. Edwards, B. Nam, J.F. Timoney, P.J. Timoney, and U.B.R. Balasuriya. Equine arteritis virus elicits a mucosal antibody response in the stallion reproductive tract during persistent infection. Clinical and Vaccine Immunology Journal 24(10):e00215–17. Published online: doi:10.1128/CVI.00215-17. PMID:2881.
Engiles, J.B., H. Steward, J.G. Janes, L.A. Kennedy. A diagnostic pathologist's guide to carpal disease in racehorses. Journal of Veterinary Diagnostic Investigation 29(4):414–430.
Janes, J.G., L.A. Kennedy, K.S. Garrett, J.B. Engiles. Common lesions of the distal end of the third metacarpal/metatarsal bone in racehorse catastrophic breakdown injuries. Journal of Veterinary Diagnostic Investigation 29(4):431–436). Published online: doi:/10.1177/1040638717717948.
Liang, D., L.M. Arnold, C.J. Stowe, R.J. Harmon, and J.M. Bewley. Estimating US dairy clinical disease costs with a stochastic simulation model. Journal of Dairy Science 100(2):1472–1486.
Smith, L.L., B. Liang, M. Booth, M. Filigenzi, A. Tkachenko, and C. Gaskill. Development and validation of quantitative UPLC-MS/MS assay for anticoagulant rodenticides in liver. Journal of Agriculture and Food Chemistry 65(31):6682–6691. Published online: doi:10.1021/acs.jafc.7b02280.
Smith, L.L., K.A. Francis, J.T. Johnson, and C.L. Gaskill. Quantitation of fumonisin B1 and B2 in feed using FMOC precolumn derivatization with HPLC and fluorescence detection. Food Chemistry 234:174–179.
Uzal, F., L. Kennedy, and G. Maxie. Special issue on racehorse pathology: In the service of equine and human welfare. Journal of Veterinary Diagnostic Investigation 29(4):381–382.
Wood, P.L., M. Steinman, E. Erol, C. Carter, U. Christmann, and A. Verma. Lipidomic analysis of immune activation in equine leptospirosis and leptospira-vaccinated horses. PLoS One 13(2):e0193424. Published online: doi:10.1371/journal.pone.0193424.

Veterinary Science

Alvarado-Esquivel, C., D.K. Howe, M.R. Yeargan, D. Alvarado-Esquivel, J. Alfredo Zamarripa-Barboza, and J.P. Dubey. Seroepidemiology of *Sarcocystis neurona* and *Neospora hughesi* infections in domestic donkeys *(Equus asinus)* in Durango, Mexico. Parasite 24:27.
Balasuriya, U.B., and M. Carossino. Reproductive effects of arteriviruses: Equine arteritis virus and porcine reproductive and respiratory syndrome virus infections. Current Opinion in Virology 27:57–70.
Balasuriya, U.B.R., and J. Zhang. Development and characterization of an infectious cDNA clone of equine arteritis virus. Methods in Molecular Biology 1602:11–28.
Balasuriya, U.B.R., P. Lee, Y. Tsai, C. Tsai, Y. Shen, H. Chang, A. Skillman, H. Thomas, S. Pronost, and Y. Zhang. Translation of a laboratory-validated equine herpesvirus-1 specific real-time PCR assay into an insulated isothermal polymerase chain reaction (iiPCR) assay for point-of-need diagnosis using POCKITTM nucleic acid analyzer. Journal of Virological Methods 241:58–63.
Boakari, Y.L., J.C. Ferreira, H.S. Canesin, D.L. Thompson, Jr., F.S. Lima, J.C.F. Pantoja, and C. Meira. Influence of two ovulation-inducing agents on the pituitary response and follicle blood flow in mares. Theriogenology 100:95–99.
Bolfa, P., I. Jeon, A. Loftis, T. Leslie, S. Marchi, F. Sithole, C. Beck, S. Lecollinet, S. Zientara, A. Hans, and C.J. Issel. Detection of West Nile virus and other common equine viruses in three locations from the Leeward Islands, West Indies. Acta Tropica 174:24–28.
Borges, A., M.R. Yeargan, L.G. Silva, I. Taques, D. Howe, and D.M. Aguiar. Antibodies against *Sarcocystis neurona*, *Neospora* spp., and *Toxoplasma gondii* in horses and mules from the Northern Pantanal Wetland of Brazil. Journal of Equine Veterinary Science 56:19–25.
Canisso, I.F., B.A. Ball, A. Esteller-Vico, N.M. Williams, E.L. Squires, and M.H. Troedsson. Changes in maternal androgens and oestrogens in mares with experimentally induced ascending placentitis. Equine Veterinary Journal 49(2):244–249.
Cappelli, K., R.F. Cook, V. Stefanetti, F. Passamonti, G.L. Autorino, M.T. Scicluna, M. Coletti, A. Verini Supplizi, and S. Capomaccio. Deep sequencing and variant analysis of an Italian pathogenic field strain of equine infectious anaemia virus. Transboundary and Emerging Diseases. Published online: doi:10.1111/tbed.12631.
Carossino, M., A.T. Loynachan, I.F. Canisso, R.F. Cook, J.R. Campos, B. Nam, Y. Go, E.L. Squires, M.H.T. Troedsson, T. Swerczek, et al. Equine arteritis virus has specific tropism for stromal cells and CD8+ T and CD21+ B lymphocytes but not for glandular epithelium at the primary site of persistent infection in the stallion reproductive tract. Journal of Virology 91(13):e00418–00417.
Carossino, M., B. Wagner, A.T. Loynachan, R.F. Cook, I.F. Canisso, L. Chelvarajan, C.L. Edwards, B. Nam, J.F. Timoney, P.J. Timoney, and U.B.R. Balasuriya. Equine arteritis virus elicits a mucosal antibody response in the reproductive tract of persistently infected stallions. Clinical and Vaccine Immunology. Pubished online: doi:10.1128/cvi.00215-17.
Carossino, M., Y. Li, P.-Y.A. Lee, C.-F. Tsai, P.-H. Chou, D. Williams, A. Skillman, R.F. Cook, G. Brown, H.-F.G. Chang, H.-T.T. Wang, and U.B.R. Balasuriya. Evaluation of a field-deployable reverse transcription-insulated isothermal PCR for rapid and sensitive on-site detection of Zika virus. BMC Infectious Diseases 17(1):778.
Chaney, S.B., A.E. Marsh, S. Lewis, M. Carman, D.K. Howe, W.J. Saville, and S.M. Reed. *Sarcocystis neurona* manipulation using culture-derived merozoites for bradyzoite and sporocyst production. Veterinary Parasitology 238:35–42.
Christoffersen, M., and M. Troedsson. Inflammation and fertility in the mare. Reproduction in Domestic Animals 52 (Suppl 3):14–20.
Claes, A., B.A. Ball, K.E. Scoggin, J.F. Roser, E.M. Woodward, G.M. Davolli, E.L. Squires, and M.H.T. Troedsson. The influence of age, antral follicle count and diestrous ovulations on estrous cycle characteristics of mares. Theriogenology 97:34–40.
Dini, D., S.C. Loux, K.E. Scoggin, A. Esteller-Vico, E.L. Squires, M.H.T. Troedsson, P.D. Daels, and B.A. Ball. Identification of reference genes for analysis of microRNA expression patterns in equine chorioallantoic membrane and serum. Molecular Biotechnology. Published online: doi:10.1007/s12033-017-0047-2.
Dubey, R., B. Harrison, S. Dangoudoubiyam, G. Bandini, K. Cheng, A. Kosber, C.A. Neresian, D.K. Howe, J. Samuelson, D.J.P. Ferguson, and M.J. Gubbels. Differential roles for IMC proteins across *Toxoplasma gondii* and *Sarcocystis neurona* development. mSphere 2(5):e00409–00417.
Elzinga, S.E., B. Rohleder, B. Schanbacher, K. McQuerry, V.D. Barker, and A.A. Adams. Metabolic and inflammatory responses to the common sweetener stevioside and a glycemic challenge in horses with equine metabolic syndrome. Domestic Animal Endocrinology 60:1–8.
Esteller-Vico, A., B.A. Ball, M.H.T. Troedsson, and E.L. Squires. Endocrine changes, fetal growth, and uterine artery hemodynamics after chronic estrogen suppression during the last trimester of equine pregnancy. Biology of Reproduction 96(2):414–423.
Fedorka, C.E., E.M. Woodward, K.E. Scoggin, A. Esteller-Vico, E.L. Squires, B.A. Ball, and M.H.T. Troedsson. The effect of cysteine-rich secretory protein-3 and lactoferrin on endometrial cytokine mRNA expression after breeding in the horse. Journal of Equine Veterinary Science 48:136–142.
Fedorka, C.E., K.E. Scoggin, E.L. Squires, B.A. Ball, and M.H.T. Troedsson. Expression and localization of cysteine-rich secretory protein-3 (CRISP-3) in the prepubertal and postpubertal male horse. Theriogenology 87:187–192.
Fedorka, C.E., K.E. Scoggin, E.M. Woodward, E.L. Squires, B.A. Ball, and M.H.T. Troedsson. The effect of select seminal plasma proteins on endometrial mRNA cytokine expression in mares susceptible to persistent mating-induced endometritis. Reproduction in Domestic Animals 52(1):89–96.
Fernandes, C.B., S.C. Loux, K.E. Scoggin, E.L. Squires, M.H. Troedsson, A. Esteller-Vico, and B.A. Ball. Sex-steroid receptors, prostaglandin E2 receptors, and cyclooxygenase in the equine cervix during estrus, diestrus and pregnancy: Gene expression and cellular localization. Animal Reproduction Science 187:141–151.
Go, Y.Y., Y.S. Kim, S. Cheon, S. Nam, K.B. Ku, M. Kim, N.H. Cho, H. Park, P.Y. Alison Lee, Y.C. Lin, Y.L. Tsai, H.-T.T. Wang, and U.B.R. Balasuriya. Evaluation and clinical validation of two field-deployable reverse transcription-insulated isothermal PCR assays for the detection of the Middle East Respiratory Syndrome Coronavirus. Journal of Molecular Diagnostics 19(6):817–827.
Gutierrez-Exposito, D., I. Garcia-Bocanegra, D.K. Howe, A. Arenas-Montes, M.R. Yeargan, S.L. Ness, L.M. Ortega-Mora, and G. Alvarez-Garcia. A serosurvey of selected cystogenic coccidia in Spanish equids: First detection

of anti-*Besnoitia* spp. specific antibodies in Europe. BMC Veterinary Research 13:128. Published online: doi:10.1186/s12917-017-1046-z.
Hemida, M.G., D.K. Chu, R.A. Perera, R.L. Ko, R.T. So, B.C. Ng, S.M. Chan, S. Chu, A.A. Alnaeem, M.A. Alhammadi, et al. Coronavirus infections in horses in Saudi Arabia and Oman. Transboundary and Emerging Diseases 64(6):2093–2103.
Kaspar, A., K. Pfister, M.K. Nielsen, C. Silaghi, H. Fink, and M.C. Scheuerle. Detection of *Strongylus vulgaris* in equine faecal samples by real-time PCR and larval culture: Method comparison and occurrence assessment. BMC Veterinary Research 13:19. Published online: doi:10.1186/s12917-016-0918-y.
Klotz, J.L., and K.J. McDowell. Tall fescue ergot alkaloids are vasoactive in equine vasculature. Journal of Animal Science 95(11):5151–5160.
Leathwick, D.M., C.W. Sauermann, T. Geurden, and M.K. Nielsen. Managing anthelmintic resistance in *Parascaris* spp.: A modelling exercise. Veterinary Parasitology 240:75–81.
Legacki, E.L., B.A. Ball, C.J. Corbin, S.C. Loux, K.E. Scoggin, S.D. Stanley, and A.J. Conley. Equine fetal adrenal, gonadal and placental steroidogenesis. Reproduction 154(4):445–454.
Loux, S.C., K.E. Scoggin, J.E. Bruemmer, I.F. Canisso, M.H.T. Troedsson, E.L. Squires, and B.A. Ball. Evaluation of circulating miRNAs during late pregnancy in the mare. PloS One 12(4):e0175045. Published online: doi:10.1371/journal.pone.0175045.
Loux, S.C., K.E. Scoggin, M.H.T. Troedsson, E.L. Squires, and B.A. Ball. Characterization of the cervical mucus plug in mares. Reproduction 153(2):197–210.
Lyons, E.T., J.L. Bellaw, A.R. Dorton, and S.C. Tolliver. Efficacy of moxidectin and an ivermectin-praziquantel combination against ascarids, strongyles, and tapeworms in Thoroughbred yearlings in field tests on a farm in Central Kentucky in 2016. Veterinary Parasitology: Regional Studies and Reports 8:123–126.
Macpherson, M.L., S. Giguere, M.A. Pozor, E. Runcan, T.W. Vickroy, S.A. Benson, M.H. Troedsson, J.N. Hatzel, J. Larson, E. Vanden Berg, et a. Pharmacokinetics of ceftiofur sodium in equine pregnancy. Journal of Veterinary Pharmacology and Therapeutics. Published online: doi:10.1111/jvp.12399.
Marsh, A.E., S.B. Chaney, D.K. Howe, W.J. Saville, and S.M. Reed. Small sarcocysts can be a feature of experimental infections with *Sarcocystis neurona* merozoites. Veterinary Parasitology 245:116–118.
Maxwell, L.K., B.G. Bentz, L.L. Gilliam, J.W. Ritchey, N. Pusterla, R. Eberle, T.C. Holbrook, D. McFarlane, G.B. Rezabek, J. Meinkoth, et al. Efficacy of the early administration of valacyclovir hydrochloride for the treatment of neuropathogenic equine herpesvirus type-1 infection in horses. American Journal of Veterinary Research 78(10):1126–1139.
Mekuria, Z.H., C. El-Hage, N.P. Ficorilli, E.A. Washington, J.R. Gilkerson, and C.A. Hartley. Mapping B lymphocytes as major reservoirs of naturally occurring latent equine herpesvirus 5 infection. Journal of General Virology 98(3):461–470.
Miller, F.L., J.L. Bellaw, E.T. Lyons, and M.K. Nielsen. *Strongyloides westeri* worm and egg counts in naturally infected young horses. Veterinary Parasitology 248:1–3.
Morales Briceño, A., K. Brewer, T. Tobin, A. Méndez Sánchez, and J. Pérez Arévalo. Hemorragia pulmonar padecimiento usual en caballos deportivos. Revista Mundo Equino Marzo April 2017:58–59.
Nardini, R., G.L. Autorino, C.J. Issel, R.F. Cook, I. Ricci, R. Frontoso, F. Rosone, and M.T. Scicluna. Evaluation of six serological ELISA kits available in Italy as screening tests for equine infectious anaemia surveillance. BMC Veterinary Research 13:105. Published online: doi:10.1186/s12917-017-1007-6.
Nielsen, M.K., and E.T. Lyons. Encysted cyathostomin larvae in foals: Progression of stages and the effect of seasonality. Veterinary Parasitology 236:108–112.
Noel, M.L., J.A. Scare, J.L. Bellaw, and M.K. Nielsen. Accuracy and precision of Mini-FLOTAC and McMaster techniques for determining equine strongyle egg counts. Journal of Equine Veterinary Science 48:182–187.
Oliveira, F.G., R.F. Cook, J.H.F. Naves, C.H.S. Oliveira, R.S. Diniz, F.J.C. Freitas, J.M. Lima, S.M. Sakamoto, R.C. Leite, C.J. Issel, and J.K.P. Reis. Equine infectious anemia prevalence in feral donkeys from northeast Brazil. Preventive Veterinary Medicine 140:30–37.
Page, A.E., J.C. Stewart, R.E. Holland, Jr., and D.W. Horohov. The impact of training regimen on the inflammatory response to exercise in two-year-old Thoroughbreds. Journal of Equine Veterinary Science 58:78–83.
Pedersen, P.J., K.B. Thomsen, J.B. Flak, M.A. Tejada, F. Hauser, D. Trachsel, R. Buhl, T. Kalbfleisch, M.S. DePriest, J.N. MacLeod, K. Calloe, and D.A. Klaerke. Molecular cloning and functional expression of the K+ channel K(V)7.1 and the regulatory subunit KCNE1 from equine myocardium. Research in Veterinary Science 113:79–86.
Pihl, T.H., M.K. Nielsen, and S. Jacobsen. Changes in hemostatic indices in foals naturally infected with *Strongylus vulgaris*. Journal of Equine Veterinary Science 54:1–7.
Pusterla, N., and T. Tobin. Therapeutics for equine protozoal myeloencephalitis. Veterinary Clinics of North America: Equine Practice 33(1):87–97.
Reinemeyer, C.R., and M.K. Nielsen. Control of helminth parasites in juvenile horses. Equine Veterinary Education 29(4):225–232.
Salas-Romero, J., K.A. Gomez-Cabrera, L.A. Aguilera-Valle, J.A. Bertot, J.E. Salas, A. Arenal, and M.K. Nielsen. Helminth egg excretion in horses kept under tropical conditions: Prevalence, distribution and risk factors. Veterinary Parasitology 243:256–259.
Salas-Romero, J., K. Gomez-Cabrera, M.B. Molento, E.T. Lyons, A. Delgado, L. Gonzalez, A. Arenal, and M.K. Nielsen. Efficacy of two extra-label anthelmintic formulations against equine strongyles in Cuba. Veterinary Parasitology: Regional Studies and Reports 8:39–42.
Saville, W.J.A., J.P. Dubey, A.E. Marsh, S.M. Reed, R.O. Keene, D.K. Howe, J. Morrow, and J.D. Workman. Testing the *Sarcocystis neurona* vaccine using an equine protozoal myeloencephalitis challenge model. Veterinary Parasitology 247:37–41.
Scare, J.A., P. Slusarewicz, M.L. Noel, K.M. Wielgus, and M.K. Nielsen. Evaluation of accuracy and precision of a smartphone-based automated parasite egg counting system in comparison to the McMaster and Mini-FLOTAC methods. Veterinary Parasitology 247:85–92.
Schaefer, R.J., M. Schubert, E. Bailey, D.L. Bannasch, E. Barrey, G.K. Bar-Gal, G. Brem, S.A. Brooks, O. Distl, R. Fries, et al. Developing a 670k genotyping array to tag ~2M SNPs across 24 horse breeds. BMC Genomics 18(1):565.
Timoney, J.F., S. Velineni, B. Ulrich, and P. Blanchard. Biotypes and ScM types of isolates of *Streptococcus canis* from diseased and healthy cats. Veterinary Record 180(14):358.
Tzelos, T., J.S.G. Barbeito, M.K. Nielsen, E.R. Morgan, J.E. Hodgkinson, and J.B. Matthews. Strongyle egg reappearance period after moxidectin treatment and its relationship with management factors in UK equine populations. Veterinary Parasitology 237:70–76.
Van Voorhis, W.C., J.S. Doggett, M. Parsons, M.A. Hulverson, R. Choi, S.L.M. Arnold, M.W. Riggs, A. Hemphill, D.K. Howe, R.H. Mealey, et al. Extended-spectrum antiprotozoal bumped kinase inhibitors: A review. Experimental Parasitology 180:71–83.
Velineni, S., A.S. Sheoran, C.C. Breathnach, N.L. Rash, R. Paillot, and J.F. Timoney. Mitogenic equine isolates of *Streptococcus zooepidemicus* from North America host superantigen genes similar to those hosted in Europe. Journal of Equine Veterinary Science 49:40–44.
Velineni, S., and J.F. Timoney. Influence of serum antibody on occurrence of *Streptococcus zooepidemicus* in the nasopharynx of weanling foals. Journal of Equine Veterinary Science 57:107–111.
Wang, J.B., S.H. Gao, Y. Mostovoy, Y.Y. Kang, M. Zagoskin, Y.Q. Sun, B. Zhang, L.K. White, A. Easton, T.B. Nutman, et al. Comparative genome analysis of programmed DNA elimination in nematodes. Genome Research 27(12):1–14.
Weyenberg, G., R. Yoshida, and D. Howe. Normalizing kernels in the Billera-Holmes-Vogtmann treespace. IEEE/ACM Transactions on Computational Biology and Bioinformatics 14(6):1359–1365.
Wood, P.L., K. Scoggin, B.A. Ball, L. Lawrence, M.H. Troedsson, K.M. Brennan, L. Goedde, and E.L. Squires. Lipidomics evaluation of the effects of feeding a yeast-based supplement containing algal docosahexaenoic acid (DHA) on DHA-containing glycerophospholipids in stallion spermatozoa. Journal of Veterinary Medical Research 4(2):1078.
Wynn, M.A.A., A. Esteller-Vico, E.L. Legacki, A.J. Conley, S.C. Loux, S.D. Stanley, T.E. Curry, Jr., E.L. Squires, M.H. Troedsson, and B.A. Ball. A comparison of progesterone assays for determination of peripheral pregnane concentrations in the late pregnant mare. Theriogenology 106:127–133.

Other Research Publications

Agricultural Economics

Cessna, J., T.B. Mark, K. Burdine, and E. Dohlman. The effects of the margin protection program for dairy producers. Published online: https://www.ers.usda.gov/amber-waves/2017/januaryfebruary/historical-analysis-of-mpp-dairy-suggests-limited-impact-on-average-margins-but-considerable-potential-for-risk-reduction/.
Richard, J., and T.B. Mark. Precision dairy herd management: A quantile approach. Proceedings, 21st International Farm Management Congress Conference, July. Published online: http://ifmaonline.org/wp-content/uploads/2017/12/17_PR_RichardsMark_w1_p2.pdf.

Rossi, J., A.L. Meyer, and J. Knappage. Beyond farmers markets: Local foods opportunities in southeastern Kentucky's retail and institutional industry. Final report of research conducted for Kentucky Center for Agriculture and Rural Development (KCARD) as part of the Power of Food project funded by the U.S. Economic Development Authority and the Appalachian Regional Commission, December.

Sewell, T., T.B. Mark, W. Snell, E. Rogers, and L. Nickell. 2016. KDA hemp pilot project survey results. Kentucky Department of Agriculture Report, April.

Woods, T.A., J.J. Rossi, and A.F. Davis. Local food vitality index: Measuring consumer attitudes toward food system attributes. Pp. 33–41. Proceedings, Journal of Food Distribution Research Conference, April.

Woods, T.A., M. Ernst, and D. Tropp. Community supported agriculture: New models for changing markets. Proceedings, Journal of Food Distribution Research Conference, April. Published online: https://www.ams.usda.gov/sites/default/files/media/CSANewModelsforChangingMarketsb.pdf.

Animal and Food Sciences

Bullock, K.D. Simple inheritance in beef cattle. eBeef.org (eXtension). Published online: http://articles.extension.org/pages/74049/simple-inheritance-in-beef-cattle.

Costa, J.H.C., and M.A. Steele. Quero mais! Como adotar um programa de alimentação de bezerras com maiores quantidadees de leite, usando ou não um alimentador automático. Revista Leite Integral 103:70–74.

Costa, J.H.C., and M.A. Steele. How to adopt an enhanced calf feeding program with or without an automated feeder. Progressive Dairyman Canada 8:41–42. Published online: https://www.progressivedairycanada.com/topics/calves-heifers/how-to-adopt-an-enhanced-calf-feeding-program-with-or-without-an-automated-feeder.

Dwyer, R.M. Commentary: Biosecurity. Lloyd's Equine Disease Quarterly 26:1.

Dwyer, R.M. Commentary: Biosecurity and hygiene. Pp. 1–2. Bluegrass Equine Digest, April.

Dwyer, R.M. National biosecurity issues: The need for speed. 8th Annual Kentucky Breeders' Short Course, Lexington.

Dwyer, R., M. Newman, A. Higdon, and K. Williams. Multi-jurisdictional animal resource coordination exercise (MARCE) 2017 exercise plan.

Newman, M., R. Dwyer, A. Higdon, and K. Williams. Multi-jurisdictional animal resource coordination exercise (MARCE) 2017 controller/evaluator handbook. Published online: http://marce.ca.uky.edu/.

Payne, K.M., B.M. Goff, S.R. Smith, J.H. Grove, M.S. Coyne, and J.W. Lehmkuhler. Enhanced efficiency nitrogen fertilizer formulation effect on pasture productivity. Proceedings, 2017 AFGC Conference. Roanoke, VA.

Rentfrow, G., C. Knight, and R.A.M. Machado. Meat cutting manual for the University of Maine Meat Cutting School.

Strouss, S., B. Barr, and M. Rossano. Assessing the use of a commercially available stall-side serum amyloid A test for diagnosing sepsis in equine neonates. Conference of Research Workers in Animal Diseases. Chicago. November 30–December 5.

Entomology

Baker, A., and D.A. Potter. Building a better monarch butterfly waystation. Greenhouse Production News, June. Pp. 36-41.

Graziosi, I., and L.K. Rieske. The battle plan: Defining a strategy to manage the emerald ash borer in Kentucky forests. Kentucky Woodlands Magazine.

Mach, B., T.D. McNamara, and D.A. Potter. Creating pollinator-friendly landscapes. Pp. 24–27. Greenhouse Production News, January.

Potter, M.F., and R. Bessin. Alien invasion: Managing the brown marmorated stink bug. Pest Control Technology 45(6):29–36.

Potter, M.F., J.M. Penn, and W. Hu. Bed bugs, hotels and travelers: Attitudes and implications. Pp. 67-73. Proceedings, 9th International Conference Urban Pests, Birmingham, UK.

Sharkey, M.J., and E.G. Chapman. Phylogeny of the Agathidinae (Hymenoptera: Braconidae) with a revised tribal classification and the description of a new genus. Pp. 823–842. Proceedings, Entomological Society of Washington 119 (Special Issue).

Steele, K.H., B.J. Stone, K. Franklin, A.J. Jesaitis, X. Zhang, H. Jiang, B.A. Webb, C. Geisler, and A. Fath-Goodin. Improving the baculovirus expression vector system with vankyrin-enhanced technology. Biotechnology Progress 33:1496–1507.

Family Sciences

Aghayeeabianeh, B., G. Cui, and A.T. Vazsonyi. The impact of low self-control and personality traits on cyberbullying perpetration. Poster. 73rd Annual Meeting of the American Society of Criminology, Philadelphia, November.

Armes, S.E., D.M. Seponski, R.J. Werner-Wilson, and L.A. Anderson. Therapist context and compassion fatigue: The mediating role of mindfulness. Proceedings, National Council on Family Relations Annual Conference, Orlando.

Cui, G., and A.T. Vazsonyi. Risk and protective factors of online sexual material use and sexual behaviors in rural adolescents from the South. Poster. Biennial Meeting of the Society for Research in Child Development, Austin, April.

Cui, G., and A.T. Vazsonyi. Do beliefs about sex behaviors mediate the link between parent-adolescent communication about sex and risky sexual behaviors? Evidence from four cultures. Proceedings, 46th Annual Meeting of the Society for Cross-Cultural Research, New Orleans, March.

Cui, G., and A.T. Vazsonyi. When do rural adolescents start sex: An investigation of the effect by use of sexually explicit materials, parental internet control, and low self-control. Proceedings, 73rd Annual Meeting of the American Society of Criminology, Philadelphia, November.

Ford, M.R., and D.B. Ross. Ethics and standards of practice in financial therapy. Special certificate presentation, Financial Therapy Association (FTA) Conference, San Diego, November.

Javakhishvili, M., A.T. Vazsonyi, and A.J. Ksinan. Do routine activities explain deviance above and beyond low self-control? A test of two criminological theories across thirty countries. Proceedings, 73rd Annual Meeting of the American Society of Criminology, Philadelphia, November.

Javakhishvili, M., A.T. Vazsonyi, H. Phagava, K. Pagava, and P.A. Michaud. Understanding ethnic differences in psychological and physical victimization among Georgian adolescents: A comparison of Armenian, Azeri, and Georgian youth. Poster, Biennial Meeting of the Society for Research in Child Development, Austin, April.

Kim, H., S. Shin, Q. Zhang, and M. Gillen. Age at first job and retirement wealth in later years. Proceedings, 63rd Annual Conference of American Council on Consumer Interests, Albuquerque, April 21–23.

Kostelic, A.F., E. Yelland, and A. Goderwis. Keys to embracing aging: A cooperative extension health challenge. Proceedings, National Council on Family Relations, Orlando, November.

Kostelic, A.F., N.D. Pope, L. Ying, and C. Coursey. AARP prepares to care: Collaborating, translating and disseminating through the university and cooperative extension. Proceedings, Association for Aging in Higher Education (AGHE), Atlanta, March.

Ksinan Jiskrova, G., and A.T. Vazsonyi. Beliefs about sex and contraception, and adolescent sexual health. Proceedings, National Council on Family Relations Annual Conference, Orlando, November.

Ksinan, A.J, A.T. Vazsonyi, and P.A. Michaud. A multi-level study of the effects of sleep quality and quantity on adolescent deviance: Comparisons by immigrant status. Poster, Biennial Meeting of the Society for Research in Child Development, Austin, April.

Ksinan, A.J., and A.T. Vazsonyi. Individual, family, and socio-structural precursors of delinquent behaviors: Revisiting the Gluecks' data. Proceedings, 73rd Annual Meeting of the American Society of Criminology, Philadelphia, November.

Liu, D., A.J. Ksinan, and A.T. Vazsonyi. Bedtimes, self-control, and deviance among rural adolescents. Poster, 73rd Annual Meeting of the American Society of Criminology, Philadelphia, November.

Liu, D., A.J. Ksinan, and A.T. Vazsonyi. Maternal support and deviance among rural adolescents: The mediating role of self-esteem. Proceedings, 73rd Annual Meeting of the American Society of Criminology, Philadelphia, November.

Novakova, L., and N.D. Wood. Perceptual bias and accuracy of sexual satisfaction in committed relationships. Proceedings, National Council on Family Relations Annual Conference, Orlando, November.

Okhotnikov, I., and N.D. Wood. Adaptation of the couples satisfaction index to Russian. Proceedings, National Council on Family Relations Annual Conference, Orlando, November.

Patrick, L.M., M. Kumashiro, and N.D. Wood. It's not about me, it's about you: Helping your partner move toward the ideal self promotes relationship satisfaction. Proceedings, Society of Southeastern Social Psychologists, Jacksonville.

Patrick, L.M., M. Kumashiro, and N.D. Wood. The influence of attachment on the Michelangelo phenomenon. Proceedings, Society for Personality and Social Psychology, Atlanta.

Vazsonyi, A.T., A.J. Ksinan, J.M. Scarpate, and E. Fessler. Maternal and paternal family processes: A cross-cultural study. Proceedings, 2017 National Council on Family Relations Annual Conference, Orlando, November.

Zhang, Q., and H. Kim. Young adults' debts and psychological distress. Proceedings, 63rd Annual of Conference of American Council on Consumer Interests, Albuquerque, April 21–23.

Forestry

Banerjee, O., M. Cicowiez, T.O. Ochuodho, M. Masozera, B. Wolde, P. Lal, S. Dudek, and J.R.R. Alavalapati. Financing the sustainable management of Rwanda's national protected areas. Working Document Number 211. ISSN 1853-0168. Center for Distributive, Labor and Social Studies. La Plata National University. La Plata, Argentina.

Barton, C. Yale Environment 360. Reclaiming Appalachia: A push to bring back native forests to coal country. December. Published online: http://e360.yale.edu/features/reclaiming-appalachia-a-push-to-bring-back-native-forests-to-coal-country.

Barton, C., C. Zipper, and J. Burger. Preface. Pp. i–iii. IN: Mary Beth Adams, ed. The forestry reclamation approach: Guide to successful reforestation of mined lands. Gen. Tech. Rep. NRS-169. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northern Research Station. Published online: https://doi.org/10.2737/NRS GTR-169.

Contreras, M., R. Freitas, L. Ribeiro, J. Stringer, and C. Clark. Multi-camera surveillance systems for time and motion studies of timber harvesting equipment. Computers and Electronics in Agriculture 135:208–215. Published online: doi:10.1016/j.compag.2017.02.005.

Cox, J.J. WKYT. Students take to the sky to survey elk. March 9. Published online: http://www.wkyt.com/content/news/UK-students-take-to-the-sky-to-survey-Ky-elk-population-415833863.html.

Crocker, E, E.B. Nelson, and B. Blossey. Soil conditioning effects of *Phragmites australis* on native wetland plant seedling survival. Ecology and Evolution 7(15):5571–5579.

Groninger, J., J. Skousen, P. Angel, C. Barton, J. Burger, and C. Zipper. Chapter 8. Pp. 8-1–8-7. Mine reclamation practices to enhance forest development through natural succession. IN: Mary Beth Adams, ed. The Forestry Reclamation Approach: Guide to successful reforestation of mined lands. Gen. Tech. Rep. NRS-169. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northern Research Station. Published online: doi:10.2737/NRS GTR-169.

Spence, C., and J.J. Cox. Tracking the elusive Martial eagle. The mAGazine: University of Kentucky College of Agriculture 18:24. Published online: https://issuu.com/ukcafe/docs/themagazine_2017-vol18_no1.

Springer, M.T. Why you should care and what wildlife are in your woods? Kentucky Woodlands Magazine 11(1):14–15.

Stringer, J. Kentucky landowners and logging BMPs. Kentucky Woodlands Magazine 11(1):1–2.

Stringer, J. Secondary ash problems. Kentucky Woodlands Magazine 11(1):23.

Stringer, J. 2017 logging BMP changes. The Kentucky LogJam 12(1):1–2.

Thomas, L. Forestry 101: Marking your woodland boundary. Kentucky Woodlands Magazine 11(1):17–19.

Thomas, W. Kentucky woodland owners: Who they are and the challenges they face. Kentucky Woodlands Magazine 11(1):3–7.

Horticulture

Geneve, R.L. Impact of seed technology on seed germination in horticultural crops. Proceedings, International Plant Propagators' Society 67.

Gregory, T., and R.L. Geneve. Use of K-IBA as a foliar spray for softwood cutting propagation. Proceedings, International Plant Propagators' Society 67.

Lewis, V., and R.L. Geneve. Developing a modified hydroponic stock plant system for minicuttings of redbud. Proceedings, International Plant Propagators' Society 67.

Wilson, S.B, R.L. Geneve, and F.T. Davies, Jr. Reflections on nearly sixty years of changes for the textbook *Plant Propagation: Principles and Practices*. Proceedings, International Plant Propagators' Society 67.

Plant and Soil Sciences

Bailey, W.A., and J.C. Rodgers. 2016. Dark tobacco response to boron. Paper AP13. Proceedings, 2016 CORESTA Congress, Berlin, Germany, October 9–13.

Bailey, W. A., J.C. Rodgers, A.B. Keeney, and M.D. Richmond. Evaluation of dark tobacco transplanting intervals following 2,4-D and saflufenacil herbicide applications. Paper AP43. Proceedings, CORESTA Agro-Phyto Joint Study Groups Meeting, Santa Cruz do Sul, Brazil, October 22–26.

Biederman, L.A., B. Mortensen, P. Fay, N. Hagenah, J. Knops, K. La Pierre, R. Laungani, E. Lind, R. McCulley, S. Power, E. Seabloom, and P. Tognetti. How do nutrients change flowering in prairies? Environmental Science Journal for Teens. September.

De Wolf, E., D. Shah, P. Paul, L. Madden, S. Crawford, D. Hane, S. Canty, D. Van Sanford, K. Imhoff, D. Miller, and P. Knight. Impact of prediction tools for Fusarium head blight in the US, 2009–2017. P. 11. IN: S. Canty, B. Wiermer, and D. Van Sanford, eds. Proceedings, 2017 National Fusarium Head Blight Forum, U.S. Wheat and Barley Scab Initiative, East Lansing, MI/Lexington.

Fitzgerald, J., C. Griffey, W. Brooks, N. Carpenter, D. Van Sanford, J.P. Murphy, N. McMaster, and D. Schmale, III. Evaluation of winter barley cultivar Nomini for quantitative resistance to Fusarium head blight. P. 84. IN: S. Canty, B. Wiermer, and D. Van Sanford, eds. Proceedings, 2017 National Fusarium Head Blight Forum, U.S. Wheat and Barley Scab Initiative, East Lansing, MI/Lexington.

Goff, B.M., C.E. Stringer, A.H. Johns, L.C. Harris, J.P. Perry, and D.W. Williams. Does industrial hemp have potential as forage? Proceedings, American Forage and Grassland Conference, Roanoke, January 22–25.

Hill, R.A., M.D. Richmond, W.A. Bailey, and J.C. Rodgers. 2016. Dark fire-cured tobacco response to potassium application rate and timing. Paper 5. Proceedings, 47th Tobacco Workers Conference, Nashville, January 11–14.

Jack, A.M., W.A. Bailey, A. Schoergendorfer, H. Ji, and Y. Wu. The pattern of benzo[a]pyrene and tobacco-specific nitrosamine accumulation in fire-cured tobacco: A comparison of two barn types. Paper AP43. Proceedings, 2016 CORESTA Congress, Berlin, Germany, October 9–13.

Keeney, A.B., and W.A. Bailey. Dark air-cured and dark fire-cured tobacco TSNA levels in response to potassium source and rate. Paper AP06. Proceedings, CORESTA Agro-Phyto Joint Study Groups Meeting, Santa Cruz do Sul, Brazil, October 22–26.

Keeney, A.B., W.A. Bailey, J.C. Rodgers, and R.A. Hill. 2016. Evaluation of Presidio and Ridomil Gold for black shank control in dark fire-cured tobacco. Paper 34. Proceedings, 47th Tobacco Workers Conference, Nashville, January 11–14.

Knott, C., L. Murdock, and E. Ritchey. Warm weather results in advanced winter wheat growth stages. UK Wheat Science News 21(1):1. Published online: https://wheatscience.ca.uky.edu/files/feb._2017_wheat_newsletter.pdf.

Munshaw, G. Mulching tree leaves for a better lawn. Video. UK Turf channel. Available online: https://www.youtube.com/watch?v=pVTY4BhsBz4.

Murdock, L., C. Bennett, M. Plummer, and R. Upton. Killing the pan one cover crop at a time. Published online: https://www.agweb.com/article/killing-the-pan-one-cover-crop-at-a-time-naa-chris-bennett/.

Payne, K.M., B.M. Goff, S.R. Smith, J.H. Grove, M.S. Coyne, and J.W. Lehmkuhler. Enhanced efficiency nitrogen fertilizer formulation effect on pasture productivity. Proceedings, American Forage and Grassland Conference, Roanoke, January 22–25.

Pitt, W.D., W.A. Bailey, B.D. Sims, and E.R. Walker. 2016. Comparison of sucker control methods for dark fire-cured tobacco. Paper 23. Proceedings, 47th Tobacco Workers Conference, Nashville, January 11–14.

Richmond, M.D., W.A. Bailey, and R.C. Pearce. 2016. Chemical topping of burley tobacco. Paper 22. Proceedings, 47th Tobacco Workers Conference, Nashville, January 11–14.

Richmond, M.D., R.C. Pearce, and W.A. Bailey. Chemically topping burley tobacco. Paper AP14. Proceedings, CORESTA Agro-Phyto Joint Study Groups Meeting, Santa Cruz do Sul, Brazil, October 22–26.

Ritchey, E.L., E. Haramoto, and C. Bradley. An integrated approach to understanding poultry litter use in corn-soybean production systems. Pp. 174–179. Proceedings, North Central Extension-Industry Soil Fertility Conference, Des Moines.

Ritchey, E., L. Murdock, J.H. Grove. Potential nitrogen contribution from terminated wheat. UK Wheat Science News 21(2):6. Published online: https://wheatscience.ca.uky.edu/files/special_freeze_issue_march_22._2017_wheat_newsletter.pdf.

Rodgers, J.C., and W.A. Bailey. 2016. Dark fire-cured tobacco response to boron. Paper 4. Proceedings, 47th Tobacco Workers Conference, Nashville, January 11–14.

Smart, P.K., M.H. Poore, B.M. Goff, C.L. Pickworth, and L. Unruh-Snyder. Comparing establishment between fed and frost seeded red clover into 'KY-31' fescue pasture. Proceedings, American Forage and Grassland Conference, Roanoke, January 22–25.

Tessmann, E., and D. Van Sanford. GWAS of scab traits in the elite eastern wheat mapping panel in an artificially warmed environment. P. 96. IN: S. Canty, B. Wiermer and D. Van Sanford, eds. Proceedings, 2017 National Fusarium Head Blight Forum, U.S. Wheat and Barley Scab Initiative, East Lansing, MI/Lexington.

Tucker, J., K. Lea, B.M. Goff, J.I. Morrison, and Y.C. Newman. The AFGC National Forage Bowl Competition: A national forage-related competition that leads to career opportunities for undergraduate agriculture students. Proceedings, 71st Pasture and Forage Crop Improvement Conference, Knoxville, June 5–7.

Wendroth, O. Wilfried Ehlers: Agronomist and Soil Physicist. Editorial. Soil and Tillage Research 171:A1-A2. Published online: doi:10.1016/j.still.2017.04.005.

Plant Pathology

Bradley, C.A., K. Mehl, and J. Duckworth. Effect of a new SDHI fungicide (adepidyn) in managing FHB and DON on soft red winter wheat in Kentucky. P. 5. IN: S. Canty, B. Wiermer, and D. Van Sanford, eds. Proceedings, 2017 National Fusarium Head Blight Forum, U.S. Wheat and Barley Scab Initiative, East Lansing, MI/Lexington.

Bradley, C.A., L.V. Madden, and P.A. Paul. Multi-state research on the effect of quinone outside inhibitor fungicides on DON contamination in wheat grain. P. 6. IN: S. Canty, B. Wiermer, and D. Van Sanford, eds. Proceedings, 2017 National Fusarium Head Blight Forum, U.S. Wheat and Barley Scab Initiative, East Lansing, MI/Lexington, KY.

Rod, K.S., C.A. Knott, and C.A. Bradley. Decreasing deoxynivalenol (DON) contamination in soft red winter wheat grain through agronomic practices in Kentucky. P. 19. IN: S. Canty, B. Wiermer, and D. Van Sanford, eds. Proceedings, 2017 National Fusarium Head Blight Forum, U.S. Wheat and Barley Scab Initiative, East Lansing, MI/Lexington.

Salgado, J.D., G. Bergstrom, C. Bradley, K. Bowen, E. Byamukama, A. Byrne, A. Collins, C. Cowger, J. Cummings, V. Chapara, M.I. Chilvers, et al. Efficacy of two-treatment fungicide programs for FHB management: A multi-state coordinated project. Pp. 20–25. IN: S. Canty, B. Wiermer, and D. Van Sanford, eds. Proceedings, 2017 National Fusarium Head Blight Forum, U.S. Wheat and Barley Scab Initiative, East Lansing, MI/Lexington.

Salgado, J.D., K. Ames, G. Bergstrom, C. Bradley, E. Byamukama, J. Cummings, V. Chapara, M.I. Chilvers, R. Dill-Macky, A. Friskop, et al. Robus management programs to minimize losses due to Fusarium head blight and deoxynivalenol in wheat. Pp. 26–27. IN: S. Canty, B. Wiermer, and D. Van Sanford, eds. Proceedings, 2017 National Fusarium Head Blight Forum, U.S. Wheat and Barley Scab Initiative, East Lansing, MI/Lexington.

Vincelli, P. Should university agricultural research scientists partner with industry? Genetic Literacy Project. Published online: https://www.geneticliteracyproject.org/2017/03/07/university-research-scientists-partner-industry/.

Vincelli, P., D. Jackson-Smith, M. Holsapple, M.A. Grusak, M. Harsh, T. Klein, J. Lambert, B.M. Lange, D.M. Lodge, J. McCluskey, et al. National Academies report has broad support. Nature Biotechnology 35:304–306. Published online: doi:10.1038/nbt.3842.

UK Veterinary Diagnostic Lab

Arnold, L.M. An ounce of prevention is worth a pound of cure: What you do now makes a big difference on calves to be born this spring. Off the Hoof, December.

Arnold, L.M. Chronic pneumonia in feeder calves? Thank *Mycoplasma bovis*. Cow Country News, December; Off the Hoof, November.

Arnold, L.M. Part II: Interpretation of water quality reports and how to address common water problems. Cow Country News, November; Off the Hoof, October.

Arnold, L.M. and Townsend, L. Epizootic hemorrhagic disease (EHD) producer update: Is it bluetongue or EHD? Cow Country News, October; Off the Hoof, September.

Arnold, L.M. The importance of water quality for cattle health and performance. Cow Country News, September; Off the Hoof, August.

Arnold, L.M. Recent vaccination research may improve high-risk stocker health. Cow Country News, August; Off the Hoof, July.

Arnold, L.M. Do you use a dart gun? BQA guidelines still apply. Cow Country News, July; Off the Hoof, June; KY Veterinary News, Fall.

Arnold, L.M. Feeding steers on corn gluten or distillers grains? Learn to recognize blockage from urinary calculi and how to prevent them. Cow Country News, June; Off the Hoof, May.

Arnold, L.M. Baleage mistakes can lead to major health consequences. Cow Country News, May; KY Dairy Notes, June; Off the Hoof, April.

Arnold, L.M. Running on empty? Lack of energy in the diet will cause cattle deaths. Cow Country News, April; Off the Hoof, March.

Arnold, L.M. Why antibiotics fail. Cow Country News, March; Off the Hoof, February; Feed Lot Magazine. Volume XXV Number 7, November.

Arnold, L.M. Understanding the BVD virus. Cow Country News, Feb; Off the Hoof, January.

Arnold, L.M. Cow/Calf producers: Beware of Johne's Disease. Cow Country News, Jan.

Carter C.N. Diagnostic laboratory rounds. Kentucky Veterinary News, Quarterly.

Gaskill, C.L., R. Cullman-Clark, L. Lachiewicz, M. Lamarre, B. Rohleder, K. Sadler, R. Sparling, and C.N. Carter. 2016 Study of current conditions of Kentucky county animal shelters and degree of compliance with Kentucky animal shelter laws. Veterinary Science Reports, University of Kentucky.

Veterinary Science

Chambers, T.M. Equine influenza beyond equines. Equine Disease Quarterly 26(4):3–4.

Fenger, C., T. Boulmetis, and T. Tobin. Out in the cold: Ingredients in over-the-counter cold medicines can wreak havoc on a trainer's livelihood and an owner's prized racehorse. Horsemen's Journal 64(1):40–42.

Fenger, C., and T. Tobin. Medication migration: The Charles Town naproxen experience and why it matters to all racing jurisdictions. Horsemen's Journal 64(3):32–35.

Fenger, C., T. Tobin, and J.D. Ecabert. No Lasix racing: Good idea or failed experiment? Horsemen's Journal 64(2):27–30.

Machin, J., T. Shults, C. Fenger, and T. Tobin. Inadvertent environmental transfer of dextromethorphan from groom to racehorse results in establishment of a pharmacologically relevant cutoff. ToxTalk 41(2):20–23.

Nielsen, M.K. Tapeworms in horses. The Horse, July.

Nielsen, M.K., E. Lyons, and S. Tolliver. An era in parasitology. The Horse, December.

Sanchez Londona, A., A. Nemec, and M.K. Nielsen. Equine internal parasites and sustainable parasite control. IN: Advanced Equine Studies, Mouse Hole Farm Productions.

Graduate Degrees

Degrees listed are from the 2017 spring semester, 2017 second summer session, and 2017 fall semester.

Ph.D. Dissertations

Agricultural Economics

Alagsam, Fuad Mohammed. Three essays in food consumption and health related issues.

Alia, Didier Yelognisse. Agricultural input intensification, productivity growth, and the transformation of African agriculture.

Burney, Shaheer. The role of SNAP and habit formation on household consumption behavior.

Chen, Bo. Essays on organic food marketing in the U.S.

Penn, Jerrod M. Environmental values, stated preferences, and hypothetical bias.

Seok, Jun Ho. Three essays on food safety regulations and international trade of agricultural products.

Zuo, Na. Natural resource, regional growth, and human capital accumulation.

Animal and Food Sciences

Huang, Jing. Differential activity and content of high-affinity glutamate transporters, content of their regulatory proteins, and capacity for glutamine and glutathione synthesis in tissues of finished versus growing steers.

Jones, Barbara Wadsworth. Behavioral gait change characterization and detection using precision dairy monitoring technologies.

Kudupoje, Manoj B. Molecularly imprinted polymers synthesized as adsorbents for ergot alkaloids: characterization and *in vitro* and *ex vivo* assessment of effects on ergot alkaloid bioavailability.

Nair, Mahesh Narayanan. Proteome basis of muscle-specific beef color stability.

Stone, Amanda. Precision dairy farming technology solutions for detecting dairy cow disease to improve dairy cow well-being.

Wang, Xu. Controlled oxidative modification with glucose oxidase to enhance the rheological and gelling properties of myofibrillar proteins.

Biosystems and Agricultural Engineering

Chattopadhyay, Somsubhra. Impact of climate change on extreme hydrological events in the Kentucky River basin.

Rounsaville, Joseph D. Relative cross track error calculations in ASABE/ISO 12188-2:2012 and power/energy analysis using a 20 HP tractor on a fully electric drivetrain.

Seyyedhasani, Hasan. Using the vehicle routing problem (VRP) to provide logistics solutions in agriculture.

Entomology

Athey, Kacie. Exploring predator-prey interactions in agroecosystems through molecular gut-content analysis.

Kalsi, Megha. The xenobiotic transcription factor cap n collar regulates expression of multiple insecticide resistance genes.

Family Sciences

Weisenhorn, D. Attitudes toward corporal punishment: The effects of sex, ethnicity, military culture, and religion.

Westmoreland, A. Couples and weight loss surgery: Experiencing success.

Forestry

Rounsaville, Todd. Invasion dynamics of the exotic liana *Euonymus fortunei* (Turcz.) Hand.-Mazz. (wintercreeper).

Plant and Soil Sciences

Crop Science

AL-Amery, Maythem. Impact of high oil and protein on agronomic traits and overall seed composition in soybean.

Sui, Xueyi. Transcriptomic analyses of *Cathatranthus Roseus* hairy roots overexpressing CRMYC2 and ORCA3 and roles of cross-family transcription factor interaction in terpenoid indole alkaloid biosynthesis.

Integrated Plant and Soil Sciences

Hao, Guijie. The role of alternative polyadenylation mediated by CPSF30 in *Arabidopsis thaliana*.

Paul, Priyanka. Transcriptional and post-translational regulation of terpenoid indole alkaloid biosynthesis in *Catharanthus roseus.*

Russell, Kathleen. Genotype x environment x management: Implications for selection to heat stress tolerance and nitrogen use efficiency in soft red winter wheat.

Plant Physiology

Serson, William. Increasing renewable oil content and utility.

Veterinary Science

Elzinga, S. Inflammation and insulin dysregulation in the horse.

Fedorka, C. An investigation into specific seminal plasma proteins and their effect on the innate immune response to breeding in the mare.

Siard, M. Lymphocyte-mediated inflamm-aging in the horse.

M.S. Theses

Agricultural Economics

Almodarra, Sattam Faleh. Investment for trade? Impact of investment from Gulf Cooperation council countries on trade.

Dant, Madeline Lynnette. An analysis of factors impacting hay auction prices and the potential for nap to reduce alfalfa revenue risk.

Richard, Jessica Ashley. The margin protection program for dairy: A forecast and ad hoc regional analysis.

Saghaian, Sayed Yasser. Export demand estimation for U.S. corn and soybeans to major destinations.

Townsend, Owen Margaret. The history of the federal milk marketing system and an analytical view of unique qualities effects on milk prices in the southeast.

Animal and Food Sciences

Collins, Kathy Flynt. The use of *Lactobacillus salivarius* L28 as bioprotective culture in dry fermented sausages.

Crites Benjamin R. Comparison of conception rates in beef cattle inseminated with either Sexedultra™ sex-sorted semen or conventional semen in fixed-time artificial insemination (FTAI) protocols.

Lamb, Kelsey Ellen. The survival of various pathogenic organisms in fats and oils.

Nolan, Derek T. An examination of milk quality effects on milk yield and dairy production economics in the Southeastern United States.

Riccioni, Kara. Influence of ergot alkaloids on rumen motility: Time and concentration of ergovaline + ergovalinine required to impact reticulorumen motility.

Snider, Miriam A. Assessment of bovine vascular serotonin receptor populations and transport of ergot alkaloids in the small intestine.

Tsai, I Ching. Differences in behavioral and physiological variables measured with precision dairy monitoring technologies associated with postpartum diseases.

Biosystems and Agricultural Engineering

Liu, Enshi. Fractionation and characterization of lignin streams from genetically engineered switchgrass.

Wolf, Katharine. A portable sensor for measuring gas emissions from dairy compost bedded pack barns.

Community and Leadership Development

Harper, Tiffany. Fast friends: Implicit bias of cross-group friendships in a college of agriculture.

Hyden, Heather. Cultivating a culture of food justice: Impacts of community based economies on farmers and neighborhood leaders in the case of fresh stop markets in Kentucky.

Jennings, Joshua Kerby. On making a difference: How photography and narrative produce the short-term missions experience.

Pekarchik, Karin. Riding through life: A lifespan study of the attitude, behaviors, and areas of educational opportunity for female equestrians toward bra use and health outcomes when engaged in equestrian sports

Price, Mya Oneisha. Feeding the soul: Voices of Kentucky women combating child hunger.

Tarpeh, Samson S. The role of the community capital framework and Christian faith-based community development organizations in Kentucky.

Tingle, Alexander. Analysis of structural and cultural changes within agricultural education from 2009-2014 which coincide with a reduction of male pre-service agricultural educators.

Turley, Courtney A. Examining cultural proficiency among secondary agricultural education youth through intercultural effectiveness and global experiences.

Warta, Rebecca L. Exploring the quality of life impact of the Bluegrass Double Dollars program.

Dietetics

Ard, Thomas Michael. Effectiveness of a face-to-face weight loss intervention paired with mobile technology among rural adults in Kentucky.

Ashton, Emily. The effects of a 16-week introductory nutrition course on dietary habits and body composition of college students.

Connelly, Paige M. Adolescent food purchasing patterns and the association with dietary intake and body mass index in rural communities in Kentucky and North Carolina.
DeWitt, Emily M. Social marketing campaign at farmers markets to encourage fruit and vegetable purchases in rural counties with a high obesity prevalence.
Gillespie, Rachel. Connecting self-efficacy of dietary choices and the association with dietary intake among rural adolescents in North Carolina and Kentucky.
Hickey, Hannah F. The school food environment and its association with dietary intake among rural adolescents.
Lee, Teresa M. Comparing mindfulness-enriched weight management to current standard practices.
McDonald, Jordan Elizabeth. Finding the link between social connectivity and dietary intake among rural adolescents in North Carolina and Kentucky.
Thomas, Rachel. Changes of percent body fat, waist circumference, and fruit and vegetable intake among division I collegiate female softball players after nutrition curriculum paired with technology.

Entomology

Kang, Ilgoo. Ecological, molecular, and morphological data: A synergistic approach to resolve species limits of lytopylus from the Area de Conservación Guanacaste, Costa Rica (Hymenoptera: Braconidae: Agathidinae).
Licht, William. What induces female kicking in *Callosobruchus maculatus*? Disentangling the effects of male traits on female mating decisions.
Nadeau, Emily. Binding, protection, and RNA delivery properties of pours silica nano particles in *Spodoptera frugiperda* cells.
Noland, Jeffrey. Risk parameters and assessment of dietary dsRNA exposure in *Folsomia candida*.
Savage, Matthew. Shifting arthropod communities associated with emerald ash borer induced ash mortality.

Family Sciences

Campbell, Alyssa M. Rape myth acceptance: A vignette approach.
Christian, Sarah E. Body image and sex: How women's body image influences and impacts sexual experiences.
Coffman, Kendall. Hooking up vs. pornography: A vignette approach about acceptability.
Elswick, Alex. Emerging adults and recovery capital: Barriers and facilitators to recovery.
Hannan, Joseph. Formative evaluation of a family cooperation board game.
Jansen, Kayla. Extended family relationships: How they impact the mental health of young adults.

Forestry

Black, Devin. Managing upland oak forests with disturbance and the implications for non-native species invasions.
Dement, Wesley. An investigation of tree growth and woody vegetation colonization on a 19-year-old forestry reclamation site.
Haymes, Caleb. Survival and cause-specific mortality of a Southeastern Kentucky deer population.
McDermott, Joe. Survival and cause-specific mortality of white-tailed deer (*Odocoileus virginianus*) neonates in a Southeastern Kentucky population.
Patterson, Clinton. Initial understory response to gap-based regeneration methods for mature upland oak forests.
Poynter, Zach. Vegetation response to repeated prescribed burning and varied wildfire severity in upland forests on the Cumberland Plateau, Kentucky.

Plant and Soil Sciences

AL-Bakri, Ahmed. Assessment of oil quantification methods in soybean and chia seeds and characterization of oil and protein in mutant chia (*Salvia hispanica* L.) seeds.
Baker, Trinity. Soil hydraulic property estimation under major land-uses in the Shawnee Hills.
Carmack, W. Jesse. Using exogenous hormone application to suppress axillary shoot development in tobacco.
Diaz, Benjamin. Studies relating PQQ biosynthesis to putative peptidases and operon structure in Pseudomonas species.
Prince, Kelly Joan. Evaluating nonstructural carbohydrate variation of cool-season grasses based on genotype management and environment.
Swiggart, Ethan. Could winter annual crop choice increase no-till double-crop soybean yield in Kentucky?
Zhou, Shuang. Evaluating soil physical and chemical properties following addition of non-composted spent coffee and tea for athletic fields.

Retailing and Tourism Management

Badgett, Jeanne. An evaluation of the quality of men's 100% cotton jersey knit t-shirts representing three retail categories.
Clark, Howard. Consumer response to table spacing in a fast-casual restaurant.
Hahnel, Katherine. An analysis of performance claims in athleisure apparel.

Veterinary Science

Angwin, Catherine-Jane. Analysis of humoral immune responses in horses with equine protozoal myeloencephalitis.
Nam, Bora. Evolution of equine arteritis virus during persistent infection in the reproductive tract of the stallion and the male donkey.
Taylor, Victoria A. Physiological changes associated with pregnant or nonpregnant mares grazing pastures of orchardgrass-bluegrass, Kentucky 31 tall fescue infected with *Epichloë coenophiala*, or KYFA 9821 tall fescue infected with the novel endophyte AR584.
Wynn, Michelle Arelia Ann. Biology and detection of pregnanes during late gestation in the mare.

Graduate Enrollment

Note: Graduate enrollment data are from the UK Office of Institutional Research.

http://www.uky.edu/iraa/studentdata/enrollment.

	2015	2016	2017	net chg
Agricultural Economics				
Master's	22	21	18	
Doctorate	27	28	27	
Major Total	49	49	45	-4
Animal and Food Sciences				
Master's	28	19	24	
Doctorate	23	28	25	
Major Total	51	47	49	+2
Biosystems and Agricultural Engineering				
Master's	14	13	18	
Doctorate	10	10	9	
Major Total	24	23	27	+4
Dietetics and Human Nutrition				
Master's	23	19	18	
Doctorate*				
Major Total	23	19	18	-1
Entomology				
Master's	14	17	10	
Doctorate	18	15	17	
Major Total	32	32	27	-5
Family Sciences				
Master's	20	16	17	
Doctorate	22	19	12	
Major Total	42	35	29	-6
Forestry				
Master's	20	20	22	
Doctorate*				
Major Total	20	20	22	+2
Plant and Soil Sciences/Horticulture				
Master's	25	23	25	
Doctorate	40	39	34	
Major Total	65	62	59	-3
Plant Pathology				
Master's	0	3	<10**	
Doctorate	13	19	13	
Major Total	13	22	13	-9
Retailing & Tourism Management				
Master's	10	14	11	
Doctorate*				
Major Total	10	14	11	-3
Rural Sociology/Career, Technology and Leadership Education				
Master's	39	33	29	
Doctorate	9			
Major Total	48	33	29	-4
Veterinary Science				
Master's	8	6	<10**	
Doctorate	17	20	20	
Major Total	25	26	20	-6
Grand Total	**402**	**382**	**349**	**-33**

**Degree type not offered.*
***Starting in 2017, Institutional Analytics uses "<10" for anything less than ten enrollments.*

Financial Statement

Statement of Federal Formula Funds

Fiscal Year 2017

Income

Federal Funds	
Hatch	5,147,730
Hatch Multi-State	1,401,460
McIntire-Stennis	570,956
Animal Health	65,218
Total Federal Funds	7,185,363
State Funds	
Total State Funds	29,941,003
Total Funds	**37,126,366**

Expenditures

	Federal	**State**	**Total**
Personal Services	5,869,084	25,377,718	31,246,802
Travel	118,039	273,833	391,872
Other Operating Expenses	1,109,287	4,082,995	5,192,282
Equipment	88,954	206,457	295,411
Total Expenditures	**7,185,363**	**29,941,003**	**37,126,366**

Staff

University of Kentucky Board of Trustees 2017

C.B. Akins, Sr.
Jennifer Yue Barber
Claude A. "Skip" Berry, III
James H. Booth
William C. Britton
Edward Britt Brockman
Mark P. Bryant
Kelly Knight Craft
Angela L. Edwards
Carol Martin "Bill" Gatton
David V. Hawpe
C. Frank Shoop
Robert D. Vance
Barbara Young

Alumni Members

Michael A. Christian
Cammie DeShields Grant
Kelly Sullivan Holland

Faculty Members

Robert Grossman
Lee X. Blonder

Staff Member

Dave Melanson

Student Member

Ben Childress

Agricultural Experiment Station

Administration

Eli Capilouto, President
Timothy S. Tracy, Provost
Nancy M. Cox, Dean
A. Rick Bennett, Associate Dean and Director of the Kentucky Agricultural Experiment Station
Angela S. Martin, Vice President of Financial Operations and Treasurer
Lisa Collins, Assistant Dean for Academic Administration
Stephen R. Workman, Associate Dean for Administration
Lesley D. Oliver, Associate Director
Tom Hanna, Assistant Director
Stephen Sizemore, Chief Financial Officer
Timothy West, Director of Business Administration
Orlando Chambers, Assistant Director for Research Farm Operations

Departments

Following are departmental faculty and leadership lists for calendar year 2017. (R) denotes Experiment Station appointment.

Agricultural Communications

Skillman, L.M., Director

Agricultural Economics

Barnett, B.J., Chair and Professor (R)

Brown, R., Assistant Professor
Buck, S., Assistant Professor (R)
Burdine, K.H., Associate Extension Professor
Davis, A., Extension Professor
Davis, T.D., Assistant Extension Professor
Dillon, C., Professor (R)
Freshwater, D., Professor (R)
Halich, G., Associate Extension Professor
Isaacs, S., Extension Professor
Kusunose, Y., Assistant Professor (R)
Mark, T., Assistant Professor (R)
Maynard, L.J., Professor (R)
Reed, M.R., Professor (R)
Saghaian, S., Professor (R)
Schieffer, J.K., Senior Lecturer
Shockley, J., Assistant Extension Professor
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., Chair and Extension Professor

Aaron, D.K., Professor (R)
Adedokun, S.A., Assistant 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)
Brennan, K.M., Adjunct Assistant Professor
Bridges, P.J., Assistant Professor (R)
Bullock, K.D., Extension Professor
Burris, R., Post-Retire Extension Professor
Camargo, F.C., Associate Extension Professor
Coleman, R.J., Associate Extension Professor
Cortese, V., Adjunct Assistant Professor
Costa, J.H.C., Assistant Professor (R)
Cox, N.M., Dean, College of Agriculture
Cromwell, G.L., Post-Retire Professor (R)
Dawson, K.A., Adjunct Professor
Dwyer, R.M., Professor
Ely, D.G., Professor (R)
Flythe, M.D., Adjunct Assistant Professor
Harmon, D.L., Professor (R)
Heersche, Jr., G., Extension Professor
Heleski, C.R., Lecturer
Hennig, B., Professor (R)
Hicks, C.L., Post-Retire Professor (R)
Holder, M., Assistant Research Professor (R)
James, E.A., Lecturer
Klotz, J.L., Adjunct Assistant Professor
Lawrence, L.M., Professor (R)
Lehmkhuler, J.W., Associate Extension Professor
Lindemann, M.D., Professor (R)
Matthews, J.C., Professor (R)
McLeod, K.R., Associate Professor (R)
Morgan, M.C., Associate Professor (R)
Pescatore, A.J., Associate Chair and Extension Professor
Pierce, J.L., Adjunct Assistant Professor
Rentfrow, G.K., Associate Extension Professor
Rossano, M.G., Associate Professor (R)
Schendel, R., Assistant Professor (R)
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., Associate Professor (R)
Vanzant, E.S., Associate Professor (R)
Vijayakumar, P.P., Assistant Extension Professor
Wahrmund, J.L., Lecturer
Wang, C., Adjunct Assistant Professor
Yiannikouris, A., Adjunct Assistant Professor
Xiong, Y., Professor (R)

Biosystems and Agricultral Engineering

Montross, M.D., Professor and Chair (R)

Adedeji, A.A., Assistant Professor (R)
Agouridis, C.T., Associate Extension Professor
Colliver, D.G., Professor
Crofcheck, C.L., Professor (R)
Dvorak, J.S., Assistant Professor (R)
Edwards, D.R., Professor (R)
Ford, W.I., Assistant Professor (R)
Hayes, M., Assistant Extension Professor
Jackson, J.J., Assistant Extension Professor
McNeill, S.G., Associate Extension Professor
Modenbach, A., Lecturer
Nokes, S.E., Professor (R)
Peterson, M.L., Professor
Purschwitz, M.A., Extension Professor
Sama, M.P., Assistant Professor (R)
Shi, J., Assistant Professor (R)
Stombaugh, T.S., Extension Professor

Community and Leadership Development

Harrison, W., Chair

Dyk, P.H., Associate Professor (R)
Epps, R.B., Associate Professor (R)
Garkovich, L.E., Extension Professor
Hains, B.J., Associate Professor (R)
Hains, K.D., Associate Extension Professor
Harris, R.P., Associate Professor (R)
Hustedde, R.J., Extension Professor
Jones, K.R., Associate Extension Professor
Kahl, D.W., Extension Assistant Professor
Rice, L., Assistant Professor
Rignall, K.E., Assistant Professor
Rossi-Meyer, A.L., Senior Lecturer
Shade, L. Lecturer
Tanaka, K., Professor (R)
Vincent, S.K., Assistant Professor
Zimmerman, J.N., Extension Professor

Dietetics and Human Nutrition

Bastin, S.S., Chair and Extension Professor

Brewer, D.P., Assistant Professor
Chow, C.K., Professor
Combs, E.M., Lecturer
Flack, K.D., Assistant Professor
Gaetke, L.M., Professor
Glauert, H.P., Professor
Gustafson, A., Associate Professor
Houlihan, J.B., Lecturer
Jackson, Y.L., Lecturer
Kurzynske, J.S., Extension Professor
Mullins, J.T., Extension Professor
Norman-Burgdolf, H.L., Assistant Extension Professor
Plasencia, J., Assistant Professor
Schwartz, A.K., Lecturer
Stephenson, T.J., Associate Professor
Webber, K.H., Associate Professor

Entomology

Palli, S.R., Chair and Professor

Bessin, R.T., Extension Professor
Brown, G.C., Professor
Dobson, S.L., Professor
Fox, C.W., Professor
Gonthier, D.J., Assistant Professor
Haynes, K.F., Professor
Obrycki, J.J., Professor
Potter, D.A., Professor
Potter, M.F., Extension Professor
Rieske-Kinney, L.K., Professor
Rittschof, C.C., Assistant Professor
Sharkey, M.J., Professor
Teets, N., Assistant Professor
Townsend, L.H., Extension Professor
Villanueva, R.T., Assistant Professor
Webb, B.A., Professor
White, J.A., Associate Professor
Zhou, X., Associate Professor

Family Sciences

Werner-Wilson, R.J., Chair and Endowed Professor (R)

Brock, G.W., Professor Emeritus
Culp, III, K., Adjunct Associate Professor
Flashman, R., Extension Professor
Haleman, D., Lecturer and Director of Undergraduate Studies
Hans, J., Professor
Heath, C.J., Professor (R)
Hunter, J.L., Associate Extension Professor and Interim Assistant Director of Family and Consumer Sciences Extension
Kim, H., Associate Professor (R) and Director of Graduate Studies
Kostelic, A., Associate Extension Professor
Smith, D.R., Associate Professor (R)
Vail, A., Professor and Interim Dean of Social Work (R)
Vazsonyi, A.T., Endowed Professor (R)
Werner-Wilson, T.A., Lecturer and Director of the University of Kentucky Family Center
Wood, N., Associate Professor (R)

Forestry

Stringer, J.W., Chair and Extension Professor

Arthur, M.A., Professor (R)
Barton, C., Professor (R)
Conners, T.E., Extension Professor

Contreras, M.A., Assistant Professor (R)
Cox, J.J., Assistant Professor (R)
Lacki, M.J., Professor (R)
Lhotka, J.M., Associate Professor (R)
Ochuodho, T., Assistant Professor (R)
Price, S.J., Assistant Professor (R)
Ringe, J.M., Professor
Springer, M., Assistant Professor (E)
Yang, J., Assistant Professor (R)

Horticulture

Houtz, R.L., Chair and Professor (R)

Antonious, G.F., Adjunct Professor
Archbold, D.D., Professor (R)
Rudolph, R.I., Extension Assistant Professor
DeBolt, S., Professor (R)
Downie, A.B., Associate Professor (R)
Dunwell, W.C., Extension Professor
Durham, R.E., Extension Professor
Fountain, W.M., Extension Professor
Geneve, R.L., Professor (R)
Ingram, D.L., Extension Professor
Jacobsen, K.L., Assistant Professor (R)
Pomper, K., Adjunct Associate Professor
Rowell, A.B., Adjunct Professor
Scott, R., Lecturer
Snyder, J.C., Associate Professor (R)
Strang, J.G., Extension Professor
Williams, M.A., Associate Professor (R)
Wright, S., Extension Specialist

Kentucky Tobacco Research and Development Center

Chambers, O., Executive Director

Bush, L., Professor
Canete, S., Scientist II
Jack, A., Research Specialist
Ji, H., Scientist III
Kroumova, A., Scientist II
Pattanaik, S., Scientist III
Perry, P., Research Coordinator
Wagner, G., Professor
Yuan, L., Research Director
Zaitlin, D., Scientist III

Landscape Architecture

Crankshaw, N.M., Chair and Professor

Davis, M.M., Adjunct Assistant Professor
Hargrove, R.A., Associate Professor
Koo, J., Assistant Extension Professor
Lee, B.D., Professor
Phemister, J.A.N., Assistant Professor
Sass, C.K., Assistant Professor
Segura, A.C., Senior Lecturer

Plant and Soil Sciences

McCulley, R., Chair and Professor (R)

Bailey, W.A., Extension Professor
Barrett, M., Professor (R)
Baskin, C.C., Professor (R)
Bush, L., Professor Emeritus
Coyne, M., Professor (R)
D'Angelo, E., Professor (R)
Dinkins, R., Adjunct Assistant Professor
Egli, D., Professor (R)
Goff, B., Assistant Professor (R)
Green, J., Extension Professor
Grove, J., Professor
Haramoto, E., Assistant Professor
Henning, J., Extension Professor
Hildebrand, D., Professor (R)
Hunt, A., Professor (R)
Kawashima, T., Assistant Professor
Kagan, I., Adjunct Professor
Knott, C., Assistant Professor
Lee, B., Associate Extension Professor
Lee, C., Extension Professor
Legleiter, T., Extension Assistant Professor
Matocha, C., Associate Professor (R)
McGrath, J., Associate Extension Professor
McNear, D., Associate Professor (R)
Miller, R., Special Title Series Professor
Moe, L., Associate Professor (R)
Munshaw, G., Associate Extension Professor
Murdock, L., Professor Emeritus, post-retirement appointment
Pearce, R., Extension Professor
Perry, S., Associate Professor (R)
Pfeiffer, T., Professor (R)
Phillips, T., Associate Professor (R)
Ren, W., Assistant Professor
Ritchey, E., Extension Associate Professor
Salmeron Cortasa, M., Assistant Professor
Sikora, F., Adjunct Associate Professor
Smalle, J., Associate Professor (R)
Smith, S.R., Extension Professor
Teutsch, C., Extension Associate Professor
Tsyusko, O., Research Assistant Professor
Unrine, J., Associate Professor (R)
Van Sanford, D., Professor (R)
Wagner, G., Professor Emeritus, post-retirement appointment
Walker, E., Extension Assistant Professor
Wendroth, O., Professor (R)
Williams, D., Professor
Yuan, L., Professor (R)
Zhu, H., Professor (R)

Plant Pathology

Schardl, C.L., Chair and Professor (R)

Bradley, C.A., Extension Professor
Farman, M.L., Professor (R)
Gauthier, N.A., Associate Extension Professor
Goodin, M.M., Professor (R)
Hirsch, R.L., Lecturer
Kachroo, A.P., Professor (R)
Kachroo P., Professor (R)
Nagy, P.D., Professor (R)
Pfeufer, E.E., Assistant Extension Professor
Vaillancourt, L.J., Professor (R)
Vincelli, P., Extension Professor
Wise, K.A., Associate Extension Professor

Regulatory Services

Johnson, D.D., Executive Director

Barrow, M.C., Inspector
Combs, J.C., Agriculture Regulatory Associate
Counts, R., Auditor
Flood, J.S., Inspector
Green, K.M., Tag Registration Specialist
Harrison, G.A., Feed/Milk Director
Hickerson, R.R., Inspector
Johnston, C.B., Inspector
Keith, N., Inspector
Kariuki, Solomon, Laboratory Manager
Mason, D.W., Inspector
McMurry, S.W., Fertilizer/Seed Director
O'Mara, Lauren, Agriculture Regulatory Associate
Pinkston, W.W., Inspector
Prather, T.G., Inspector
Sikora, F.J., Soil Testing/Lab Director and Associate Professor
True, J.A., Inspection Coordinator
Webb, S.F., QA/QC Director
Young, B., Inspector

Retailing and Tourism Management

Jackson, V.P., Chair and Professor

Cavender, R., Assistant Professor
Easter, E. Professor
Lee, M., Associate Professor
Lu, T. Assistant Professor
Meuret, S., Lecturer
Pryor, M., Lecturer
Spillman, K., Associate Professor
Swanson, J., Associate Professor
Wesley, S., Associate Professor
Zhang, P., Assistant Professor

UK Veterinary Diagnostic Laboratory

Carter, C.N., Director and Professor

Arnold, Michelle, Ruminant Veterinarian and Associate Professor
Bryant, U.K., Veterinary Pathologist and Associate Professor
Bolin, D.C., Associate Professor and Section Head
Cassone, L.M.C., Assistant Professor
Cruz-Penn, Michael, Clinical Instructor
Erdal Erol, Associate Professor and Section Head
Gaskill, C.L., Associate Professor
Janes, Jennifer, Assistant Professor
Kennedy, L.A., Assistant Professor
Loynachan, A.T., Associate Professor
Maples, Deborah, Section Head
Saied, Ahmad, Assistant Professor
Smith, Jacqueline, Section Head

Veterinary Science

Horohov, D.W., Chair and Professor (R)

Adams, A., Assistant Professor
Bailey, E.F., Professor (R)
Balasuriya, U.B., Professor (R)
Ball, B.A., Professor (R)
Chambers, T.M., Associate Professor (R)
Chapman, S., Adjunct Assistant Professor
Christmann, U., Adjunct Assistant Professor
Cook, R.F., Associate Professor
Esteller Vico, A., Assistant Professor
Graves, K.T., Associate Professor
Hale, G., Librarian II
Howe, D.K., Professor (R)
Issel, C.J., Professor (R)
Kalbfleisch, T., Adjunct Associate Professor
Lyons, E.T., Professor (R)
MacLeod, J.N., Professor (R)
McDowell, K.J., Associate Professor (R)
Nielsen, M.K., Assistant Professor (R)
Reed, S., Adjunct Professor
Shaffer, C.L., Assistant Professor
Slusarewicz, P., Adjunct Assistant Professor
Squires, E.L., Adjunct Professor
Swerczek, T.W., Professor Emeritus
Timoney, J.F., Professor Emeritus
Timoney, P.J., Professor
Tobin, T., Professor (R)
Troedsson, M.H.T., Professor (R)
Verma, A., Adjunct Assistant Professor
Wood, P., Adjunct Professor
Zent, W., Adjunct Professor

Editor—Angelique Cain, Agricultural Communications Services
Designer—Dennis Duross, Agricultural Communications Services

Look for the College of Agriculture, Food and Environment on the World Wide Web at www.ca.uky.edu.

Issued 5-2021