



University of Kentucky Veterinary Diagnostic Laboratory Annual KAES Report, 2012

Craig N. Carter, Director & Professor, Epidemiology

Overview--

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

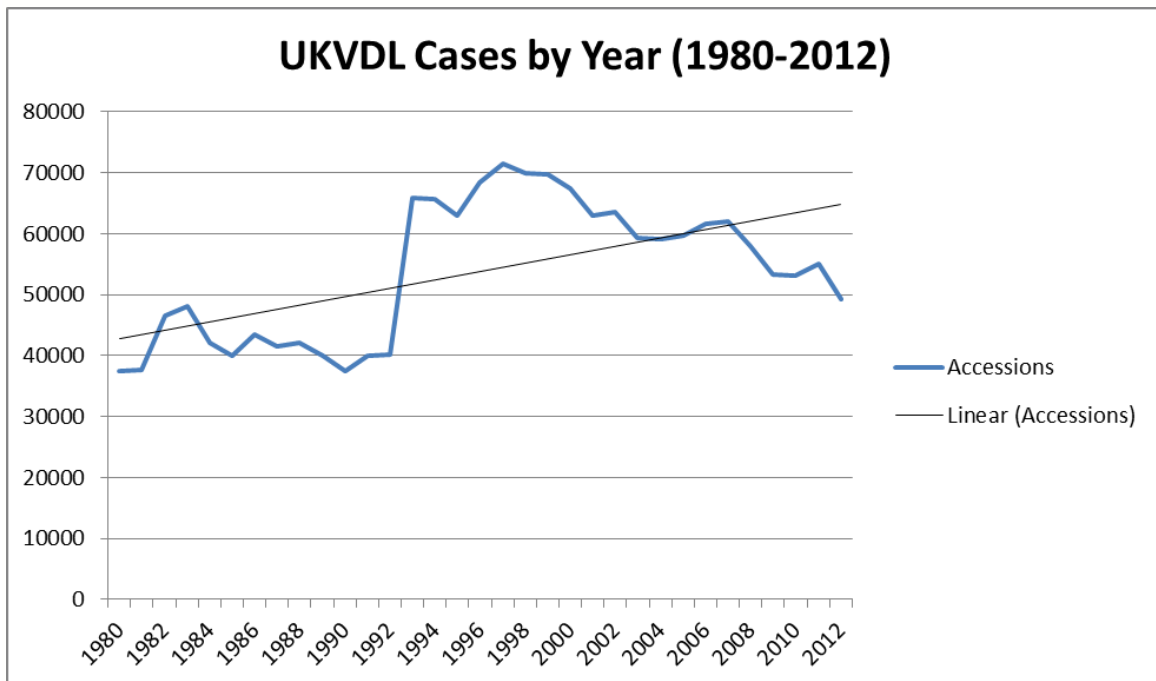
In addition to its clinical diagnostic role, the UKVDL provides surveillance for emerging and endemic diseases such as equine infectious anemia (EIA), equine piroplasmiasis, West Nile virus, chronic wasting disease of deer, contagious equine metritis, bovine spongiform encephalitis (Mad Cow Disease), Johne's disease, bovine leukosis, avian influenza, rabies and many other diseases of agricultural, public health and companion animal importance. Furthermore, the laboratory is always on the watch for the emergence of foreign animal diseases (FADs) such as foot and mouth disease, and classical swine fever. In 2012, UKVDL continued its proficiency testing programs as part of the National Animal Health Laboratory Network.

Farmers and animal owners use the UKVDL's services through their practicing veterinarians. These professionals have expertise in selecting, preparing, shipping, and submitting the proper specimens for testing when

needed to assist in making a clinical diagnosis. Laboratory findings are reported back to the submitting veterinarian who then consults with his or her clients to implement a treatment protocol or a preventative solution to disease problems on the farm. A state-of-the-art Laboratory Information Management System (LIMS) is utilized at our laboratory which enables UKVDL to provide the most professional, accurate and timely accessioning, order entry, results capture and clinical case reporting for our clients.

UKVDL faculty, scientists, and technical staff are specialists in several diagnostic medical disciplines directly related to animal health to include bacteriology, clinical pathology, epidemiology, extension, molecular biology, pathology, serology, toxicology, virology and informatics. Disease diagnostic efforts are coordinated and handled by specialists in the appropriate disciplines. Complex clinical cases involving multiple sections are monitored by highly qualified case coordinators. During surge testing periods and disease outbreaks, trained technicians are redistributed across sections to assure that the increased workload can be managed in a timely and accurate fashion.

The UKVDL received 49,250 cases in calendar year 2012 (a 10% decrease from calendar year 2011, including 3391 necropsies (17% decrease from calendar year 2011)). This increase is attributed to the outbreak of Nocardioform Placentitis which occurred that year which significantly added to the necropsy load). The decrease in diagnostic caseload is attributed primarily to the continued depressed state of the Kentucky horse industries. Total tests run in each laboratory section will be listed in the individual section reports.



Outreach--

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

January 26

Name: Cynthia Gaskill

University affiliation: UK Veterinary Diagnostic Laboratory

Subject Matter: Case studies in equine toxicology

February 23

Name: Rob Foss

University affiliation: Equine Medical Service, Columbia, MO

Subject Matter: Approach to assisted reproduction

March 29

Name: Jim Belknap

University affiliation: Ohio State University

Subject Matter: Laminitis

April 26

Name: Kent Allen

University affiliation: Virginia Equine Imaging, Middleburg, VA

Subject Matter: Lameness and diagnostic imaging

May 31

Name: Martin Nielsen

University affiliation: UK Gluck Equine Research Center

Subject Matter: Equine parasites

June 28

Name: Alicia Bertone

University affiliation: Ohio State University

Subject Matter: Joint diseases

July 26

Name: Amanda Adams

University affiliation: UK Gluck Equine Research Center

Subject Matter: Stress of weaning

August 30

Name: Craig Carter

University affiliation: UK Veterinary Diagnostic Laboratory

Subject Matter: Equine leptospirosis

September 27

Name: Robert Mealey

University affiliation: Washington State University

Subject Matter: Equine piroplasmiasis

October 18

Name: Reid Hanson

University affiliation: Auburn University

Subject Matter: Sport horse musculoskeletal injuries

November 15

Name: David Horohov and Allen Page

University affiliation: UK Gluck Equine Research Center

Subject Matter: Update on equine proliferative enteropathy

Other outreach events:

- Food Animal Practitioner Conference, Feb 13, 2013, 40 veterinarians in attendance.
- Poultry Veterinarian Training Symposium, Mar 21, 2013, 40 in attendance.
- Center for Leadership Development – How horses have influenced leadership/career development, held in the UKVDL auditorium, Apr 17.
- Lincoln County High School Beef Production Club tour – 40 students, teacher Mr. Steven Bullock.
- Dr. Carter attended the EAVLD meeting in Kazimierz-Dolny, Poland July 1-5, 2012 as Immediate Past President of the AAVLD and Executive Director of the WAVLD.
- Food Animal Practitioner Conference, Aug 16, 2012, 35 veterinarians in attendance.
- The Director and eight UKVDL employees attended the AAVLD meeting in Greensboro, NC for continuing education and delivering scientific presentations.
- The Director and staff attended the Poultry Health Advisory Committee meeting in Frankfort, Oct 25.
- The Director made a presentation on UKVDL contributions to the Equine Program at the Equine Forum meeting on Oct 26 in the Good Barn, Weldon Suite.

- The Director delivered a lecture on the Livestock Care Standards Commission to an Animal Science class on Oct 30.
- The Director attended the NIAA Symposium on Antimicrobial Resistance in Columbus, OH Nov 13-15.
- UKVDL hosted the *Lawsonia* and Equine Proliferative Enteropathy Symposium on Nov 15th from -7:30. The program was attended by about 80 people.
- The Future of Public Health and One Health. Presented to a forum of the School of Public Health and Medicine, Robert C. Byrd Medical Center, West Virginia University, Dec 3, 2-12.
- Preliminary results of a nocardioform placentitis farm-based risk factor study, presented to the Kentucky Association of Equine Practitioners and Kentucky Thoroughbred Farm Managers Club, Jan 30, 2012.

Personnel actions--

Many thanks to Deans Smith and Cox for supporting the UKVDL in filling vacant positions and other personnel actions in calendar year 2012. The following key positions were filled and/or reclassified:

- Dr. Erdal Erol, Head, Diagnostic Microbiology – position converted from a Scientist III to Associate Professor, Clinical Title Series (non-tenure track).
- Dr. Laura Kennedy, Veterinary Pathologist – position converted from Special Title Series to Clinical Title Series (non-tenure track).
- Dr. Uneeda Bryant, promoted to Associate Professor with full tenure.
- Latissa O’Cull – hired as a histology technician.
- Christina Kane – hired as Accounting Clerk III.
- Amy Barnes – hired as the Histology Section Chief.

Visiting scientists--

- Dr. Oktay Genc – Turkish veterinarian worked in the Bacteriology section on Nocardioform placentitis, May-Oct, 2012.
- Dr. Masood Rabbani – Pakistani veterinarian visited from Aug 8-14 to learn about a modern veterinary diagnostic laboratory and to explore options for Pakistan scientists to train in the US.

Notable achievements or advancements—

- Director served as Immediate Past President of the American Association of Veterinary Laboratory Diagnosticians
- Director continues to serve as Executive Director of the World Association of Veterinary Laboratory Diagnosticians and is planning a meeting to be held in Berlin, Germany, June, 2013.

- Director was appointed to chair a committee to conduct a periodic review of the Department of Animal and Food Science.
- Director chaired the USDA-ARS 5-year research review panel.
- Director and Associate Director served on the committee to plan the International Equine Infectious Disease meeting which was held in Lexington, Oct 21-25, 2012.
- Almost all post-construction issues have been resolved by the end of 2012.
- New web site for UKVDL is nearing completion, should be implemented in early 2013.
- Automated scanning of accession forms and related case documents with automated attachment to the USA LIMS software system.
- New virtual server rack installed and implemented, May.
- 10 GB bandwidth high speed dark fiber hub installed at UKVDL.
- Development of financial workload/fee trend reports almost completed.
- UKVDL staff participated in a Low Path Avian Influenza Exercise, Elizabethtown, KY Mar 7, 2012.
- Director attended the KY State Board of Agriculture to meet the new Commissioner of Agriculture, James Comer.
- Director worked with the Office of the State Veterinarian and the Commissioner of Agriculture to allow charging a fee for Stockyard EIA testing.
- UKVDL video security system implemented for expanded facilities.
- As appointed by the Governor, the Director served on the Livestock Care and Standards Commission in 2012.
- Director Chaired the national search for the Director, Regulatory Services.
- Q-Pulse QA/QC software selected for use at UKVDL in preparation for the upcoming AAVLD accreditation visit in 2014. It will be implemented in the spring of 2013.
- Dr. Carter chaired an OIE Committee on Genomics in Paris, France, Dec 3-7, 2013.

Initiatives and programs—

- The new UKVDL fee schedule went into effect Jul 1. Overall, 134 test fees out of 286 total tests were increased (47%) with the strategy to increase fee income by \$230,8510 (17.5%).
- Ms. Valerie Blakemore from the MedTech College in Coldstream toured the UKVDL facilities to see if our laboratory might be able to host interns in their Clinical Laboratory Technician program, Dec, 2012.
- Director discussed a possible genomics laboratory for the UKVDL that would collaborate with the Gluck Equine Research Institute and Texas A&M University (Apr 2-6).

- As part of the UKVDL marketing plan, business office staff compiled a data base of equine practices in an 8-state area and a mail-out was done to encourage the use of the laboratory.
- Director developed one-page summaries of species-oriented diagnostic testing services offered by UKVDL for mailing out and for distribution at scientific and animal agricultural meetings.

Major issues and challenges--

- UKVDL continues to experience budget cuts. A 7.55% additional budget cut was implemented on Jul 1, 2012 (\$247,000). A marketing plan is well underway to assist in increasing income in an attempt these cuts.
 - ✓ Enhance and improve test offerings and service for equine & small animal medicine
 - ✓ Develop a national reputation as an equine diagnostic testing laboratory
- Incentive-based budgeting model for the University of Kentucky---how will this affect mandated non-teaching programs?
- Investigation and alerting of equine abortion cases, Fall, 2012
- Investigation and alerting of equine lawsonia cases, Fall, 2012
- Investigation and alerting of equine leprospirosis cases, Spring, 2012
- Recurring and non-recurring budget cuts, 2009-present:

Funding Source	Fiscal Year	Recurring/Non-Recurring	Amount Cut
KDA	Fy2009	Recurring	\$78,500
KDA	Fy2011	Recurring	8,000
State	Fy2009	No cut	No cut
State	Fy2011	Recurring	\$33,323
State	Fy2012	Recurring	86,859
State	Fy2013	Recurring	247,000
Total recurring cuts			\$453,718

Section Reports--

Bacteriology/Mycology

Dr. Erdal Erol

Bacteriology/Mycology Section of UKVDL performs several types of culture to isolate and identify pathogenic bacteria or fungi from animals. The Section also determines the antimicrobial susceptibility that might be used for the treatment of specific pathogens. Another important duty of this section is regulatory testing. The section performs culture for *Taylorella equigenitalis* and *T. asinigenitalis* for the federal/state CEM regulatory program in equine. The bacteriology section routinely participates in federal proficiency and ring tests for salmonella, CEM and general bacteriology.

Highlights:

- 9689 aerobic cultures were performed on samples submitted to the UKVDL; significant bacterial pathogens were found in these samples such as Nocardioform bacteria, coliforms, Beta-hemolytic streptococci, Salmonella, Pasteurella, Mannheimia, Arcanabacterium, Mycoplasma and Staphylococci.
- 7288 samples from equines in Kentucky were cultured for the contagious equine metritis organisms. All horses tested were negative. Because of the detection of positive CEM horses by this Section in 2008 and 2011, we continue to receive higher number of samples. Early detection of this infection in the Quarter Horse population by this laboratory prevented this disease from becoming more widespread in the equine population of the USA.
- 2715 microbial isolates were tested to determine the antimicrobials that could be used for their treatment in exposed animals. Antimicrobial susceptibility test was performed broth microdilution method,
- 477 sample from poultry were tested for salmonellosis by using a protocol following National Poultry Improvement Plan (NPIP). Our participation in NPIP helps poultry industry improve infectious disease control and eradication programs.
- Our laboratory has significant collaboration with other institutes such as UK- Gluck Center (Dr. Troedsson, Nocardioform), Pfizer (antimicrobial susceptibility) and University of Kopenhagen (Dr. Peterson, beta-hemolytic streptococci).

Virology

Dr. Erdal Erol

This important section performs several virological assays. These assays provide veterinarians and animal owners to diagnose viral infections and treat and protect their animals. Virology section investigated several disease outbreaks in Kentucky and performed a number of testings submitted by practitioners and owners not only from Kentucky but also from many other states. Our section also works closely with UKVDL pathology section to examine necropsy specimens for evidence of viral infections. Another important duty of Virology section is to perform tests necessary for export of animals to other states and other countries. The virology section also provides consultancy to the field veterinarians and animal owners concerning sample selection, preservation, shipping procedures and interpretation of results. The section had collaborations with other institutes (such as Pfizer).

Highlights:

In this section, several thousands of Fluorescent antibody tests (FA), Virus Neutralization tests, ELISA tests and virus isolation tests were performed in 2012 to support Kentucky animal industry and beyond.

Number of major tests performed in Virology section were shown in the Table below:

Bovine Corona Virus- FA	143
Bovine Respiratory Syncytial Virus- FA	508
Bovine Respiratory Syncytial Virus- VN	57
Bovine Rotavirus- FA	104
Bovine Viral Diarrhea- ELISA	11021
Bovine Viral Diarrhea- FA	810
Bovine Viral Diarrhea 1-VN	171
Bovine Viral Diarrhea 2-VN	171
Canine Adenovirus- FA	33
Canine Corona Virus- FA	33
Canine Distemper Virus- FA	162
Canine Herpesvirus-FA	38
Canine Parvovirus- FA	123
Equine Herpesvirus 1-FA	906
Equine Herpesvirus 1- VN	106
Equine Influenza A1- HI	30
Equine Influenza A2-HI	1931
Equine Rotavirus-FA	23
Equine Viral Arteritis- VN	11577
Feline Herpesvirus- FA	37

Feline Infectious Peritonitis- FA	81
Feline Panleukopenia-FA	70
Infectious Bovine Rhinotracheitis-FA	625
Infectious Bovine Rhinotracheitis-VN	133
Parainfluenza-3 Virus-FA	507
Potomac Horse Fever- IFA	175
Vesicular Stomatitis IN- VN	1233
Vesicular Stomatitis NJ- VN	1233
Virus Isolation	148
West Nile IgM Capture	135

Molecular Diagnostics

Dr. Erdal Erol

Nucleic acid based tests are now used so that unknown organisms can be identified, closely related organisms can be differentiated, and small numbers of pathogens can be detected in complex samples. Several Diagnostic PCR assays are being utilized because of their speed and specificity. This section performs several PCR, real-time PCR and DNA sequencing assays from the specimens submitted by animal owners, veterinarians and pathologists. This section also analyzes specimens received from the Virology and Bacteriology sections to confirm their diagnosis.

Highlights:

- The molecular diagnostics section successfully demonstrated our 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 testings such as Foot and Mouth disease, Classical swine fever and Avian influenza. The membership enables this unit to actively participate in national veterinary disease surveillance and provide rapid coordinated diagnostic response in the event of future outbreaks within the veterinary industry.
- We have standardized a new protocol for calf diarrhea panel which is now offered as a service to our large animal practitioners. This panel is able to test fecal specimens from calf with diarrhea and detects bovine corona

virus, bovine rotavirus group A, E. coli K99, Salmonella and Cryptosporidium.

- The section tested several thousands of molecular tests in 2012 and the major ones are provided in the below table.

Amycolatopsis	199
Bovine Viral Diarrhea	31
Crossiella equi	217
EHV-1	746
EHV-1 TYPING	30
Ehv-4	177
Equine influenza	302
Lawsonia intracellularis	114
leptospira	666
Johnes	87
Potomac horse fever	230
Rhodococcus equi	82
salmonella	624
Streptococcus equi	413
West nile	65

Pathology, general

Neil M. Williams

The UK Veterinary Diagnostic Laboratory pathology section is composed of 7 faculty pathologists, a staff laboratory animal pathologist, 4 post-doctoral scholars (pathology residents), 4 histology technicians, 4 full time necropsy technicians, and 2 part time necropsy student workers. The pathologists perform complete necropsy examinations on submitted animals, histopathology on necropsy cases and surgical biopsies, and cytological examinations, and are supported by the other section personnel. As part of the comprehensive necropsy examination, additional laboratory tests are ordered by the pathologist to aid in confirming a diagnosis. The abnormal findings on necropsy are correlated with other laboratory tests, including microscopic examination of the tissues, and a comprehensive report is prepared for every pathology case. Utilizing the abundant cases submitted to the VDL and the faculty expertise, post-doctoral scholars (DVM) are trained in veterinary anatomic pathology in a 3-year program, visiting senior veterinary students have extern rotations, and surgical residents visit to fulfill the pathology requirement for the American College of Veterinary Surgeons.

Necropsy: A postmortem examination (necropsy) is conducted on animals submitted to the VDL in order to identify any pathologic changes in the tissues that would indicate disease, injury, toxicosis, or any other abnormal process resulting in illness.

Total Necropsy Cases	3,391
Avian	20
Bovine	813
Caprine	108
Equine	1583
Ovine	135
Porcine	16
Small Animal	350
Miscellaneous	33
Laboratory Animal	213

Histopathology: Tissues are prepared and processed to produce glass slides for microscopic examination conducted by the pathologists. Tissues from the necropsy and surgical biopsy cases were processed and 34,190 microscopic slides produced. In addition to the routine hematoxylin and eosin stained tissue sections, special and immunohistochemical stains were done resulting in 2,075 slides produced for the purpose of identifying microscopic organisms/agents that may cause disease or tissue antigens that define or identify cell structures.

Biopsy: Abnormal areas or lesions are often removed surgically or a portion biopsied from live animals and sent to the laboratory for determination of the type of process, recommended treatment, and potential prognosis. These tissue specimens are processed and microscopic slides prepared for the pathologists to examine by microscopy. Tissue specimens representing 3,507 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.

Cytology: Preparations of cells harvested from abnormal lesions or abnormal fluids are placed on microscopic slides and stained for examination under the microscope by the pathologists. Cytopathological examinations were performed, a diagnosis made, and a report generated for 479 cases.

Pathology, research animal

Kathryn (Casey) Coyle

The research animal pathology service sees mostly small rodents with occasional dogs, rabbits, nonhuman primates, and pigs. There were over 249 submissions from research animals during 2012 including clinical pathology samples, biopsies and necropsies. In addition to research animal work, Dr. Coyle is handling the diagnostic pathology case load for the agricultural research animals housed at the various UK farms.

Quality Control/Quality Assurance

Mary Harbour

The goal of the UKVDL Quality Assurance Program is continuous quality improvement of service. An additional goal of this program is to ensure the quality, accuracy and timeliness of all test results to veterinarians, animal owners, UK researchers and other clients in the animal industry. The Quality Team monitors test results, quality control results and Proficiency Testing.

The Quality Assurance Program is based on Quality System concepts of the American Association of Veterinary Diagnostic Laboratory (AAVLD) Requirements, International Standards Organization (ISO 17025) guidelines and Organization of International Epizootics (OIE).

The QA section has assisted in preparing reports and submitting data to the National Animal Health Laboratory Network (NAHLN) and the Veterinary Laboratory Network (Vet-LRN). The section continues implementing all policies and procedures required by NAHLN and Vet-LRN and assisted the director and laboratory sections in securing grant funds for salaries, equipment and supplies.

The requirements for maintaining the Quality System and Management are continuously being updated. To maintain conformance to all requirements, the QA Manager attended Quality Assurance and Quality Management Training sponsored by NAHLN at the AAVLD Annual meeting. Internal section audits are conducted throughout the year in preparation for the next AAVLD accreditation visit.

The Quality Assurance Program helps fulfill the university's mission of improving service delivery while achieving excellent human relations (internally and externally), sound leadership, and effective communications.

Ruminant Extension

L. Michelle Arnold

The Ruminant Extension Veterinarian is charged with improving the status of ruminant health by establishing and maintaining information flow among all the stakeholders in the livestock industry. This is accomplished through open communication with food animal veterinarians, county extension personnel, producers, state and federal authorities and University faculty and staff in a progressive and responsive manor. Current health topics including disease risk and occurrence, diagnosis, treatment, prevention and control form the core of the information disseminated. New knowledge generated at the University level, governmental directives, and other stakeholder contributions are also gathered centrally then communicated openly for discussion and action to ultimately benefit producers throughout Kentucky.

Highlights

- Presented the herd health portion of the new Master Stocker Program in 6 regions of the state. Updated and presented the herd health portion of

- Master Cattlemen in 7 regions and 3 Master Grazer sessions. These programs directly affected approximately 300 farming enterprises.
- Hosted two well-attended food animal veterinary continuing education meetings at the diagnostic laboratory (UKVDL) and one at the Breathitt Veterinary Center (BVC). A total of 22 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 Pfizer and featured Dr. Vic Cortese as guest speaker. Forty food animal veterinarians attended the winter meeting. A summer meeting was held at the Breathitt Veterinary Center in June. Boehringer Ingelheim Vetmedica Inc. (BIVI) sponsored the event that was attended by 25 food animal veterinarians from the western portion of the state. The final CE meeting was held in August at the UKVDL sponsored by BIVI and Elanco Animal Health. Thirty five veterinarians were in attendance.
 - Co-sponsored the Small Ruminant Grazing Conference in Bowling Green that drew 75 participants in 2012. This conference changes to a different location in Kentucky each year in order to reach sheep and goat producers in all areas of the state.
 - Worked with Dr. Erol to develop a neonatal calf diarrhea panel which is a PCR test for 5 of the major pathogens that cause diarrhea in the first 21 days of life. Plans for abortion panels and respiratory pathogens are in the works.
 - Launched the new extension program: Improving Reproductive Efficiency in Beef Cattle in Northern KY with Drs. Les Anderson, Jeff Lehmkuhler, and Darrh Bullock.
 - Published two fact sheets with Dr. Jeffrey Bewley (Animal Science): Recommended Milking Procedures for Maximum Milk Quality (ID-208) by Bewley and Arnold; Management of the Dry Cow to Prevent Mastitis (ID-209) by Arnold and Bewley. Published fact sheet on Infectious Bovine Keratoconjunctivitis ("Pinkeye") in Cattle (ID-135) by Arnold and Dr. Jeff Lehmkuhler.
 - Participated in an Extension agent informational meeting about nitrates in forages after the drought via internet (Microsoft Lync) with Dr. Cindy Gaskill and many extension specialists in the areas of dairy, beef, forages, and crops.
 - Co-authored three animal health bulletins with Dr. Cynthia Gaskill on nitrates, cyanide, and mycotoxins in formats for veterinarians and alternate versions for extension and producers.
 - Participated in numerous field days, producer meetings and farm visits throughout the state to educate producers as well as to identify the scope of existing problems and find ways to promote positive change.
 - Worked closely with the State Veterinarian's office to inform producers of the new animal disease traceability regulations.
 - Continued to work collaboratively with state officials, industry representatives, and producers to draft the Livestock Standards Care

document. I contributed the university position on tail docking in dairy cattle.

- Continue to expand the database of food animal veterinarians that will allow rapid communication in the event of an animal emergency situation or disease outbreak. This database is continually updated with email addresses and cell phone numbers to enhance the speed of communication.
- Regularly contributed health related articles for the Ag Extension newsletters "Off the Hoof" (10 articles) and "KY Dairy Notes" (7 articles). I also contributed 7 articles to "Cow Country News", the official publication of the KY Cattlemen's Association.
- Submitted material for the KY Veterinary News from the KVMA and the veterinary listserv distributed from the diagnostic laboratory.
- Played a major role in writing the budget justification on the Southeast Quality Milk Initiative (SQMI) grant submitted to AFRI which is now officially funded. This is a multi-state effort including 6 southeastern states for 3 million dollars over a 5 year funding period to begin February 2013.

Kentucky veterinarians, extension agents, producers, government entities and the University benefit from a strong livestock sector of which health is a major consideration. In 2012, this position served to reach each of these stakeholders for the overall improvement of livestock health and sustainability of the food animal veterinary profession.

Serology

Meg Steinman

The mission of the Serology Section is to provide accurate and timely results for both diagnostic and regulatory testing. The results generated provide veterinarians and regulatory personnel with data upon which to base their decisions. This section also performs testing for movement of animals within the United States and for international export purposes. We were able to send personnel from this section to training for poultry testing and to the National Veterinary Services Laboratory for training in running the MAT *Leptospira* testing. This section offers a wide variety of tests by various types of methodologies; the tests and numbers listed below are just a sampling of what is available. Please check the website for additional test offerings.

Equines: This section successfully passed the annual USDA-APHIS inspection to continue to offer Equine Infectious Anemia (EIA) antibody testing and piroplasmiasis testing. In 2012, we ran 21,960 EIA tests. The serology section continues to monitor equines moving through the state stockyards for EIA antibody, testing 11,533 specimens. All employees of this section passed the required NVSL proficiency testing for piroplasmiasis testing (*Babesia caballi* and *Theileria equi*), and tested 4,137 specimens for antibodies to *Babesia caballi* and 4,146 specimens for *Theileria equi*. We tested 917 serum samples for antibody

to Contagious Equine Metritis (CEM-CF). Serology performs antibody screening tests for *Leptospira* in equines for diagnostic and regulatory purposes. In 2012, we tested approximately 7,000 serums.

Poultry: In 2012 the section chief of serology, Meg Steinman, worked with the Kentucky Poultry Federation to host a day of poultry training for veterinarians. The training targeted “backyard producers” and included didactic lectures on respiratory disease, enteric diseases, leukosis diseases, Avian Influenza, concluding with a discussion of internal/external parasites. The laboratory continues to pass annual inspections and maintain status as an NPIP approved laboratory. Personnel from this section attended National Poultry Improvement Plan (NPIP) approved training course for *Mycoplasma* testing and Avian Influenza testing. In 2012 the serology laboratory tested 5,170 samples for antibody to Avian Influenza, 17,981 samples for antibody to *Salmonella pullorum*, 22,005 samples for antibody to both *Mycoplasma gallisepticum*, and *Mycoplasma synoviae*.

Bovines: This section offers a variety of antibody tests performed on serum from bovines and other ruminant species. In 2012 we tested 228 specimens for antibodies to *Anaplasma marginale*, 95 specimens for antibody to Bluetongue virus, 250 specimens for antibodies to the Bovine Leukemia Virus, 1,111 serums for Johne’s (*Mycobacterium paratuberculosis*) antibodies, 400 samples for *Leptospira* antibodies, and 437 specimens for antibody to *Neospora canicum*. This lab is also active in regulatory screening for antibodies to *Brucella abortus*, testing 1,382 serums.

Small ruminants: The serology section runs testing on small ruminants, including *Brucella melitensis* (46) and small lentivirus Caprine Arthritis/Encephalitis Virus antibody (137).

Canine and feline: This section offers a variety of tests that can be run on dogs and cats. We added an antibody test for Feline Infectious Peritonitis (Feline Coronavirus). We offer an antibody test for Histoplasma and Blastomyces. A few examples of the testing done in 2012 include 140 for antibodies to histoplasmosis, and 166 samples for antibodies to blastomyces. Serology also offers *Brucella canis testing*, an important test for breeding, and tested 99 samples.

Porcine: This section also offers testing for swine. In 2012 we tested 117 samples for Pseudorabies and *Brucella* antibodies.

Toxicology

Cynthia L. Gaskill

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

Consultation services include assistance with therapeutic advice; differential diagnoses; residue considerations; toxicological risk assessments; determination of appropriate tests; appropriate sample collection and submission recommendations; interpretation of analytical results; and other general toxicological information. Many consultation cases require many hours to days or longer to complete. In 2012, Dr. Gaskill provided over 2,000 toxicological consultations. Dr. Gaskill also provides the State Veterinarian's office with alerts and updates on all cases of poisoning or contaminated animal feeds diagnosed at the UKVDL. The section personnel consist of Dr. Cynthia Gaskill, DVM PhD, Clinical Veterinary Toxicologist and section head; DR. Lori Smith, PhD, Senior Analytical Chemist; Michelle Helm, BSc, chemist/technician; and several student interns.

Highlights

- In 2012, many feed related problems occurred due to severe environmental heat and drought conditions. These issues included nitrate accumulation in forages, increased cyanogenic risks, and increased mycotoxin production in grain crops. As a result, the Toxicology section performed a large number of forage and feed tests for these toxins. Dr. Gaskill worked with other UK specialists to initiate the UK Mycotoxin Working Group and create a centralized UK website for information on mycotoxin. This group includes specialists in grain crops, plant pathology, beef and dairy nutrition, veterinary medicine, poultry production, swine production, veterinary toxicology, regulatory services, agricultural engineering, and other areas.
- The Toxicology section initiated and coordinated an inter-laboratory proficiency program for nitrate testing for the AAVLD/AAVCT Toxicology working group, in cooperation with the FDA Vet-LRN agency. This proficiency involved the majority of veterinary diagnostic laboratories in North America and improved nitrate test consistency and reporting across veterinary diagnostic laboratories.

- The Toxicology section collaborated with other UK specialists to develop and distribute safe, new rapid field test kits for nitrate and cyanide testing of forages.
- Dr. Gaskill collaborated with other UK specialists to write and distribute information updates and publications on nitrate, cyanide, mycotoxin, and other issues, and participated in several UK Extension Lync sessions focused on these topics.
- Acquired a large FDA Vet-LRN grant shared with microbiology that will help fund instrumentation maintenance costs, student labor and supplies associated with increased analyses in large-scale events of contaminated animal feeds and drugs.
- Initiated fee changes for toxicology tests to make the lab more competitive. This resulted in increased submissions from county extension agents and veterinary diagnostic laboratories from other states.
- Hosted 4 student interns for the Forensic Science internship program at Eastern Kentucky University, a graduate student from North Dakota State University, and a graduate student from UK.
- Continued to provide forage ergovaline analyses for the University of Kentucky Horse Pasture Evaluation program
- Developed and validated several new diagnostic toxicology tests, including aflatoxins in feeds and milk, and zearalenone and ochratoxin A in feeds.
- Participated in a number of proficiency testing programs to ensure accuracy and quality control for analytical methods
- Completed the conversion of the Toxicology section to a predominantly paper-free laboratory, with electronic documentation system to reduce paper costs, increase efficiency, and improve data storage and retrieval capabilities
- Worked closely with UK Regulatory Services on a number of cases involving feed contaminations requiring feed recalls

The UK Toxicology section participated in several research projects directly applicable to improvements in diagnostic offerings. The funding for these projects help support instrumentation and labor used also for diagnostic purposes. A few 2012 projects are:

- Development of a novel quantitative method for cyanide analysis of forage and plant materials and development of a rapid semi-quantitative field test for cyanide in plants
- Investigation of the effects of harvest, transport, storage and processing conditions on ergovaline analyses of tall fescue
- Analysis of trace elements in liver tissue from aborted, stillborn and neonatal foals to develop normal reference ranges for this group
- Liver elemental concentrations in Alabama cattle exposed to water with algal blooms
- Completed a study of ocular fluid nitrate and nitrite concentrations in aborted, stillborn, and neonatal foals to establish a normal reference range for this group

Research findings, methodology, continuing education programs and seminars were presented at numerous meetings and conferences including:

- American Association of Veterinary Clinical Toxicologists conference
- American Association of Veterinary Laboratory Diagnosticians conference
- Kentucky Veterinary Medical Association annual conference
- University of Kentucky Veterinary Sciences seminar series
- University of Kentucky cooperative extension summer food animal conference
- University of Kentucky cooperative extension Eastern Region Cattlemen's short course
- Eastern Kentucky University Department of Chemistry Seminar series
- University of Kentucky Agricultural Biotechnology Program seminar series
- FBI multi Sector Infrastructure Protection and Threat Workshop, Frankfort KY
- North American Mounted Unit Commanders Association conference

In 2012, the Toxicology section received samples from more than 1,500 diagnostic cases, with most cases involving multiple samples such as various forage and feed samples, tissues, body fluids, baits and other samples, and often involving multiple animals and multiple test requests per case. The most common tests requested in 2012 were forage nitrate analyses, mycotoxin analyses, metal and mineral quantifications in tissues such as liver and kidney, screening of rumen and stomach contents for organic compounds, and analysis of environmental samples for pesticides and metals.

Epidemiology

Jacqueline L. Smith

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

The section also conducts data acquisition and statistical analysis in support of the Office of the State Veterinarian, 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, while unusual or emergency disease situations are reported immediately. In-depth field investigations to better characterize disease outbreaks for identifying causative etiology through the collection of diagnostic specimens and recommending diagnostic testing are provided free of charge to

any farm/producer in the state of Kentucky at the request of a local client with the approval of the UKVDL administration.

Highlights

- Research farm visits (UK Beef unit) for NIHS Project – 7 visits
- Conducted 372 telephone consults asking for suggestions, recommendations and questions related to animal health issues.
- Statistical requests (from UKVDL faculty, state and federal officials, local veterinarians, and other UK faculty) – 121 (1-10hrs each)
- Graphics requests – 93 (2-10 hrs each)
- Reportable disease reports sent: 52 weekly reports (approx. 1 hour each week)

Educational Achievement

- Epidemiology section chief successfully defended and received her PhD in Animal Science.

Research Projects in Progress

- Continuous health monitoring of cattle: Dr. Craig Carter, Ms. Jackie Smith
- Animal disease cluster detection: Dr. Craig Carter, Ms. Jackie Smith
- Mobile Wireless & Remote Diagnostic Computer Applications, Dr. Craig N. Carter, Dr. Wade Northington, Dr. Michelle Bilderback, Ms. Jackie Smith, Dr. Cindy Gaskill and Ms. Jacki Cassady
- US Leptospirosis Sero-epidemiological Survey, Dr. Craig Carter, Dr. Noah Cohen, Ms. Jackie Smith, Ms. Meg Steinman, Dr. Erdal Erol

**UK Veterinary Diagnostic Laboratory Faculty and
Professional Veterinary Scientists
2012**

Michelle Arnold, DVM, ABVP Ruminant Extension Veterinarian

Bryant, U.K., DVM, Associate Professor

Bolin, D.C., DVM, PhD, DACVP, Associate Professor

Carter, C.N., DVM, MS, PhD, DACPVM, DSNAP, Professor and Director (R)

Cassone, L.M.C., BS, DVM, DACVP, Assistant Professor

Coyle, Kathryn, DVM, DACVP, Laboratory Animal Pathology Service

Erdal Erol, DVM MS PhD, Associate Professor & Head, Diagnostic Microbiology

Gaskill, C.L., DVM, PhD, Associate Professor

Jackson, C.B., DVM, DACVP, DACPVM, Associate Professor

Kennedy, L.A., DVM, ACVP, Assistant Professor

Loynachan, A.T., BS, DVM, PhD, Assistant Professor

Smith, Jacqueline, PhD, Section Chief, Epidemiology

Vickers, M.L., PhD, Associate Professor (phased retirement appointment)

Williams, Deborah, DVM, Head, Diagnostic Services

Williams, N.M., DVM, PhD, DACVP, Professor and Associate Director

Books and Book Chapters:

- Gaskill CL, ed. Toxicology-related chapters. IN: D. Wilson, ed. The Clinical Veterinary Advisor: the Horse. Saunders, St. Louis, MO. 2012. 1078 pages
- Gaskill CL. Toxicological Differential Diagnoses. In: Wilson D, Ed. The Veterinary Clinical Advisor: the Horse. Saunders, St. Louis MO; 2012: Section III; pp. 885-897
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- Loynachan AT. "Diseases of the Cardiovascular System." Diseases of Swine, Tenth Edition. Ed. J Zimmerman, L Karriker, A Ramirez, K Schwartz, and G Stevenson. Hoboken: John Wiley & Sons, Inc, 2012.
- Williams, N.M. Equine abortion. In Njaa, B. (ed): Kirkbride's Diagnosis of Abortion and Neonatal Loss in Animals, 4th ed. Wiley, 2012, pp. 147-171.

Refereed Journal Publications

- Erol E, Sells SF, Williams NM, Kennedy L, Locke SL, Labeda DP, Donahue JM, and Carter CM. An investigation of a recent outbreak of Nocardioform placentitis caused abortions in horses. *Veterinary Microbiology* 2012 Aug 17;158(3-4):425-30
- Erol E, Williams NM, Sells SF, Kennedy L, Locke SJ, Donahue JM, Carter CN. Antibiotic susceptibility patterns of *Crossiella equi* and *Amycolatopsis* species causing nocardioform placentitis in horses. *J Vet Diagn Invest.* 2012 Nov;24(6):1158-61
- Erol E., Locke S., Donahue J., Mackin M. and Carter C. Beta-hemolytic streptococci in horses: a retrospective study between 2000 and 2010. *J. Vet. Diagn. Invest.* 2012 Jan;24(1):142-7
- Noah D. Cohen, Kyle R. Kuskie, Jacqueline L. Smith, Nathan M., Slovis, Stuart E. Brown, Randolph S. Stepusin, M. Keith Chaffin, Shinji Takai, Craig N. Carter: Association of airborne concentrations of virulent *Rhodococcus equi* with location (foaling stall versus paddock) and month (January through June) at 30 breeding farms in central Kentucky. *AJVR*, Vol 73, No. 10, October 2012.
- U. Bryant, L. Fallon, M. Lee, and R. Pool. *Congenital Aneurysmal Bone Cyst in a Foal.* *Journal of Equine Veterinary Science.* June 2012 (Vol.32, Issue 6, pages 320-323).

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Williams, N.M. and U.K. Bryant. 2012. Periparturient arterial rupture in mares: a postmortem study. *J. Eq. Vet. Sci.* 32:281-284.

Refereed Journal Publications (Under Review/In Press)

Erdal Erol, Carney Jackson, Ying Bai, Stephen Sells, Steve Locke and Michael Kosoy *Bartonella bovis* isolated from a cow with endocarditis. *J Vet Diagn Invest* In Press

Other Publications

Abstracts

Equine nocardioform placentitis and abortion outbreak and farm-based risk factor study, 2010-2011 *Craig N. Carter, Jacki C Cassady, Noah Cohen, Laura A Kennedy, Erdal Erol, Tamara Malm, Mike Donahue, Steve Sells, Neil Williams, Jacqueline Smith, Roberta Dwyer* 2nd Congress of the European Association of Veterinary Laboratory Diagnosticians, Poland, July, 2012

Real-time PCR for detection of *Leptospira interrogans* serovar Pomona type kennewicki in equine clinical specimens. *SC Artiushin, JF Timoney, UB Balasuriya, E Erol, SF Sells*, International Conference on Equine Infectious Diseases IX, Lexington, KY, October, 2012

Spontaneous and experimental placentitis/abortion by *Streptococcus zooepidemicus* in mares *Clemann Mitchel, A.-M, M. R. Petersen, E. Erol, K. Lu, M. H. T. Troedsson, A. M. Bojesen* International Conference on Equine Infectious Diseases IX, Lexington, KY, October, 2012

Seroepidemiology of equine leptospirosis utilizing diagnostic laboratory specimens from 29 states (US) and one Canadian province, *Craig N. Carter, Noah Cohen, Meg N. Steinman, Jacqueline L. Smith, Erdal Erol, Stuart Brown*, 55th Annual AAVLD meeting, Greensboro, NC, October 2012.

Bartonella bovis isolated from a cow with endocarditis. *Erdal Erol, Carney Jackson, Ying Bai, Stephen Sells, Steve Locke and Michael Kosoy*. 55th Annual AAVLD meeting, Greensboro, NC, October 2012

Diagnostic investigation of real-time PCR, fluorescent antibody, and microscopic agglutination tests in cases of equine abortion. *Erdal Erol, Neil M. Williams, Stephen F. Sells, Margaret Steinman, Judy Donahoe, Katherine Meares, Alan*

Loynachan, James M. Donahue, Craig N. Carter. 55th Annual AAVLD meeting, Greensboro, NC, October 2012

Invited Speaker at South Central Association for Clinical Microbiology Fall 2012 Meeting, entitled “ Zoonotic diseases: a perspective from University of Kentucky Veterinary Diagnostic Laboratory” Louisville, October 2012

Gaskill CL and Smith LL. Reference intervals for inorganic element concentrations in equine fetal liver tissue. Proceedings, 55th Annual Conference of the American Association of Veterinary Laboratory Diagnosticians, Greensborough, NC, October 2012. p. 69

Gaskill CL. Current topics in equine toxicology. Treatment of poisoned horses. Proceedings, 101th annual Kentucky Veterinary Medical Association and 39th Mid-America Veterinary Conference, Louisville, KY October 2012. pp. 24-32.

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Cassady JC, Carter CN, Ronald NC, Arnold ML, Gaskill CL, Smith J, Northington CA: Development and evaluation of a mobile diagnostic computer application for veterinary diagnostic laboratories. Proceedings of the 55th Annual AAVLD meeting, Greensboro, NC, October 2012, p 168.

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Gaskill CL and Arnold M. Mycotoxins and their effects on cattle. Cow Country News, a publication of the Kentucky Cattleman’s Association. Nov 2012. p. 34.

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Arnold M and Gaskill CL. Mycotoxins and their effects on cattle. Kentucky Veterinary News, a publication of the Kentucky Veterinary Medical Association, Winter 2012. pp. 26-27

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Bewley, J.M. and L.M. Arnold. 2012. Recommended Milking Procedures for Maximum Milk Quality. University of Kentucky College of Agriculture Extension Factsheet. ID-208.

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Arnold, L.M. Summer 2012: The New Animal Disease Traceability Proposed Rule: The Interstate Certificate of Veterinary Inspection (ICVI). KY Veterinary News.

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Extramural Funding

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Erol E. An integrated approach to control of bovine respiratory diseases (NC-1027), \$50,000.00. USDA Multistate Hatch Grant. 2011-2012

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Other Research Projects

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Evaluation of DART-linear ion trap methodology for quantitation of ethylene glycol and glycolic acid in urine, serum, stomach contents, bait and tissues. Collaboration: Dr. Darrin Smith (Easter Kentucky University), Stephanie Kimball, Dr. Cynthia Gaskill and Dr. Lori Smith (University of Kentucky), 2012.

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Genbank Register

None submitted

Patent's/Copyrights Filed

U.S. Provisional patent UKRF1821, USPO App. #61/755,356, docket #13177N1821US – “Health Monitoring System”; Craig Carter, Eric Vanzant, Jacqueline Smith, Agricola Odoi, Cris Anderson, Feb 2013.