



University of Kentucky Veterinary Diagnostic Laboratory Annual Report, 2011

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)

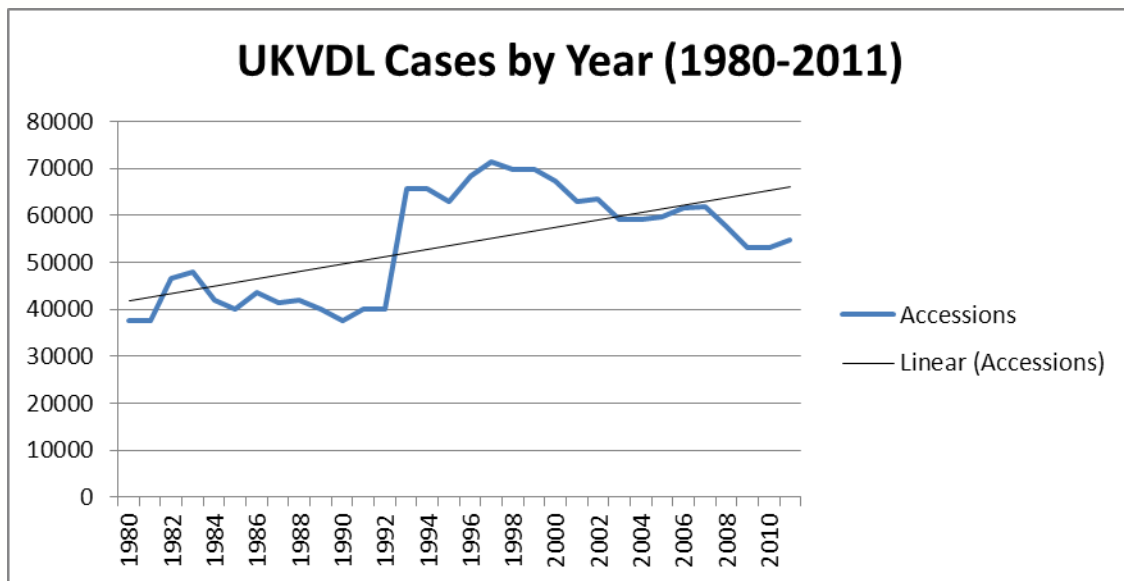
In addition to its clinical diagnostic role, the UKVDL provides surveillance for emerging and endemic diseases such as equine infectious anemia (EIA), equine piroplasmiasis, West Nile virus, chronic wasting disease of deer, contagious equine metritis, bovine spongiform encephalitis (Mad Cow Disease), Johne's disease, bovine leukosis, avian influenza 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 2011, 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.

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. The UKVDL is organized into sections so that specialized workload/activities can be handled efficiently.

The UKVDL received 54,939 cases in calendar year 2011 (3.4% increase from calendar year 2010, the overall linear trend line is increasing as well) including 4128 necropsies (28.3% increase from calendar year 2010, much of this increase can be attributed to the outbreak of nocardioform placentitis). The increase in caseload and necropsy procedures is encouraging in light of current economic conditions. However, cattle prices have been strong and the horse industry shows signs of recovery. 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 almost 650 UKVDL clients, scientists, farmers and stakeholders. Several research visits were conducted by the epidemiology section on Kentucky farms including visits to the UKY Woodford Farm as part of

a Department of Homeland Security research project. 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.

Personnel actions--

Many thanks to Deans Smith and Cox for supporting the UKVDL in filling vacant positions in calendar year 2011. The following key positions were filled:

- Head, Diagnostic Microbiology, Dr. Erdal Erol
- Pathology, Research Animal, Dr. Kathryn “Casey” Coyle
- Pathology Veterinary Technician, Ms. Judy Tucker
- Account Clerk II, Ms. Michelle Cooper
- Account Clerk III, Ms. Christina Kane
- Business Office Manager, Mr. Ryan Redimarker
- Histology Section Chief, Ms. Jamie Howard
- IT Specialist, Mr. Derrick Miles
- Toxicology technician, Ms. Michelle Helm

Two key technician positions were converted from STEPS to fully-budgeted positions in the Molecular Biology Section:

- Senior Technician, Ms. Ashley Skillman
- Senior Technician, Ms. Naomi Meyer-Kelly

Notable achievements or advancements—

- Served as the UKVDL key construction liaison person to the Construction Manager (CM), University of Kentucky Capital Project Management Division (CPMD), College of Agriculture engineers, and other key players. Saw to it that the UKVDL expansion/renovation was completed successfully, including coordination of the final move in to the new facilities, May 2011.
- Participated in planning and execution of a new facility Dedication Ceremony, May, 2011 including hosting Ms. Jane Beshear, 1st lady of Kentucky.
- The UKVDL LDDC was accepted as a full member of the FDA’s Veterinary Laboratory Response Network (VetLRN), October, 2011. As part of the VetLRN, UKVDL will be trained and equipped to conduct laboratory testing in support of surveillance for and response to animal health problems related to feeds.

Initiatives and programs—

- Transfer of Dr. Kathryn Coyle and Ms. Judy Tucker to UKVDL to conduct the research animal pathology program for the University of Kentucky.
 - ✓ The transfer of research animal pathology to UKVDL was completed in 2011. The UKVDL is now the home for research animal pathology for the UK community. We are fortunate as part of this administrative change to also be able to welcome two new members to our pathology team. Dr. Kathryn (Casey) Coyle is the research animal pathologist for UK and came to UK from the University of Wisconsin. She completed her pathology residency at the University of Minnesota and the University of Wisconsin. During and after her residency, she was one of the pathologists for the Milwaukee County Zoo and worked as a pathologist at the National Wildlife Health Laboratory in Madison. She was also one of the research animal pathologists for the University of Wisconsin which has one of the largest research programs in the country. Ms. Judy Tucker is the pathology veterinary technician. She received her training at Murray State University and is a certified veterinary technician. In addition to her duties in research animal pathology, Ms. Tucker is assisting in the VDL clinical pathology laboratory.
- Implementation of the TREK automated antibiotic sensitivity system.
- ABI 7500 Real-Time PCR machine to support molecular diagnostics.
- Acquired a LC MS MS unit from the USDA in support of toxicology.
- Manage KY-VetLabNet listserv bulletins to nearly over 600 subscribed clients to maintain a high level of situational awareness of animal health events.
- Field investigations/research studies for clients as requested/needed, epidemiology section (over 150 farms 2011).
- Agricultural extension consulting – fielding incoming calls from extension agents

Major issues and challenges--

- UKVDL continues to experience budget cuts. A marketing plan is 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
- Investigation and alerting of Potomac Horse Fever cases, August, 2011
- Investigation and alerting of the causes of bovine deaths in central Kentucky, June, 2011
- Investigation and alerting of Nocardioform placentitis abortion outbreak, January-June, 2011
- Equine leptospirosis investigation and alerting, December, 2011

In November, 2011, Dr. Craig Carter, Director, UKVDL finished his term as President of the American Association of Veterinary Laboratory Diagnosticians and will serve as Immediate Past President for 2012. Dr. Carter is also Executive Director of the World Association of Veterinary Laboratory Diagnosticians. He is currently planning for a scientific symposium on diagnostic veterinary medicine and an OIE session in Berlin, Germany scheduled for June, 2013. Dr. Carter received the K.F. Meyer-James Steele Gold Headed Cane Award in Epidemiology at the AVMA meeting in St. Louis, July, 2011. Finally, he continues to serve on the OIE Expert Committee for Reference Laboratories and Collaborating Centers, Paris, France.

Section Reports--

Bacteriology/Mycology

Erdal Erol

The primary mission of the Bacteriology/Mycology Section is to detect or isolate and identify pathogenic bacteria or fungi present in animals to assist veterinarians and farmers in the diagnosis and treatment of disease processes. The section also determines the optimal antibiotics that might be used for the treatment of specific bacterial infections. Finally, the section is also responsible for culture of *Taylorella equigenitalis* and *T. asinigenitalis* for the federal/state CEM regulatory program in equine.

Highlights

- The major tests were highlighted in the below Table. 10,095 aerobic cultures were performed on samples submitted to the UKVDL; significant bacterial pathogens were found in these samples such as Nocardioform bacteria (Amycolaptosis, Cr. equi,) coliforms, Beta-hemolytic streptococci, Salmonella, Pasteurella, Mannheimia, Arcanabacterium, Mycoplasma and Staphylococci.
- 8,647 samples from equines in Kentucky were cultured for the contagious equine metritis organisms. With the exception of one case where *T. asinigenitalis* was isolated, all horses tested were negative. Because of the detection of 4 positive stallions by this section in late 2008, 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 equine populations in the US.
- A new antimicrobial susceptibility system that utilizes Broth Microdilution Method was implemented this year. This system now allows us to perform antibiotic susceptibility on many more microorganisms including Nocardioform bacteria, anaerobic bacteria and some fungi. 2,638 different bacterial isolates were tested to determine the best antibiotics that could be used for their treatment in infected animals.

- 607 milk samples from dairy cows were tested for microorganisms that cause mastitis; over 50% were positive for pathogenic microorganisms.
- Our laboratory section has had significant collaboration with other institutes such as Gluck Equine Research Center (Dr. Troedsson, Nocardiform), the Department of Animal and Food Sciences (Dr. Jeffrey Bewley, mastitis study), Pfizer (antimicrobial susceptibility) and the University of Copenhagen (Dr. Peterson, beta-hemolytic streptococci).
- We have established a protocol to identify Salmonella bacteria in poultry following the NPIP protocol. We now provide service for poultry industry for Salmonella culture following NPIP protocol.

The total number of tests performed in Bacteriology section is provided in this table:

Culture-Aerobic	10,095
Contagious Equine Metritis	8,647
Antimicrobial susceptibility	2,638
Culture-Ruminant Mastitis	607
Culture-Microaerophilic	298
Salmonella (NPIP)	257
Culture-Fungal	182
Culture-Johne's	182
Culture-Anaerobic	176
Clostridium spp	130
Culture-Mycoplasma	121
Difficile Toxin A/B	25
Culture-Listeria	24

Clinical Pathology Section

Bonnie L. Decker

The primary mission of the Clinical Pathology is to provide chemistry, hematology, endocrine, urinalysis, fluid analysis, fecal parasite exams, and other testing to animal owners, veterinarians and the agriculture community. The section also provides support and testing to UKVDL's pathologists and testing related to necropsy as well as University of Kentucky equine and animal science researchers who can submit specimens to Clinical Pathology for monitoring various chemistry, hematology and endocrine levels in their research animals.

In 2011 this section moved into a new, larger facility that allowed the department to spread out and be more efficient. The new facility also allows for continued growth of the department. More tests are being brought in for 2012 to provide equine veterinarians with more diagnostic information.

Clinical Pathology completes its testing same day as receipt with a few exceptions. Cryptosporidium and protein electrophoresis require more time and are reported within 5 working days of receipt. Progesterones and Canine TSH must be in department by 2:00 pm for same day turn around.

The department personnel consist of 1.50 FTE. A section chief with a BS MT (ASCP) and 34 year's experience in veterinary and human diagnostic laboratory testing works full time. A part time veterinary technician with 15 year's experience completes the department. Other qualified UKVDL personnel volunteer to provide additional technical assistance as needed in the laboratory during surge periods and times when primary staff are out of the lab. Faculty and professional staff assist with diagnostic consultations.

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

Highlights

- Moved into new laboratory with expanded workspace and facilities.
- 29% increase in number of tests run as compared to 2010.
- Increase in variety of tests run.
- Larger percentages of small animal tests run than in 2010.

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 – 21 visits
- Total research visit time – 124 hrs
- Surveys – 2
 - ✓ National Equine Leptospirosis Seroepidemiological Study
 - ✓ Kentucky Equine Nocardioform placentitis farm study
- Conducted 216 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) – 59 (1-10hrs each)
- Graphics requests – 63 (2-10 hrs each)
- Reportable disease reports sent: 52 weekly reports (approx. 1 hour each week)
- Implementation of new GIS software allowing for generation of state and national level maps to be quickly prepared and ready for dissemination via email, web or print.

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

Molecular Diagnostics

Erdal Erol/Stephen Sells

Diagnostic PCR assays are being increasingly utilized because of their speed and specificity. 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. Specimens

such as blood, swabs, washes, and feces are accepted directly from clinicians. This section of the laboratory also analyzes specimens received from the pathology, virology and bacteriology sections of this and other diagnostic facilities.

Highlights

- This section is now occupies a newly renovated 2000 square foot laboratory devoted to state of the art and emerging diagnostic techniques.
- The molecular diagnostics section successfully demonstrated our ability to provide accurate, rapid, high-volume testing and built upon the diagnostic lab's status as a fully accredited laboratory by the American Association of Veterinary Laboratory Diagnosticians and also became an accredited member of the USDA's National Animal Laboratory Health Network. 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.
- This section continues to be responsible for providing the majority of Kentucky's arbovirus (mosquito-borne virus) testing as part of an environmental risk analysis program with the Kentucky Department for Human Health.
- Working with the new head of microbiology we have developed standardized protocols for new diagnostic assays which are now offered as a service to our large and small animal practitioners. These are rapid, sensitive, diagnostic PCR tests for **Canine Influenza Virus, Equine Influenza Virus, Equine Protozoal Myeloencephalitis** (caused by *Sarcocystis neurona*) and ***Clostridium piliforme* (Tyzzer's Disease)**. In addition the methodology of the assays for **Equine herpesvirus types 1 and 4, and *Mycobacterium paratuberculosis*** was converted from traditional qualitative gel based PCR to real-time PCR allowing for the addition of a quantitative estimation of those pathogens when detected.
- Approximately 6,000 specimens were submitted for PCR testing in 500 accessioned cases.
- The most requested tests included leptospira (1640), equine herpesvirus type 1 and EHV1 pathotyping (654), EHV4 (213), *Streptococcus equi subsp. equi* (534), *Crossiella equi* (42) and *Amycolatopsis species* (796), *Clostridium perfringens* (43 accessions), *Lawsonia intracellularis* (146), *Neorickettsia risticii* Potomac Horse Fever (200), BVDV (31 accessions), *Moraxella bovis* (9), EHV5 (83), and EHV2 (86),
- In cooperation with researchers at Michigan State University, the normal flora of the male genital tract of donkeys is being determined. An important preliminary finding of this study is that *Taylorella asinigenitalis*, one of the bacteria causing contagious equine metritis, is sometimes a part of the normal flora of male donkeys and that it can persist for at least 12 months in these animals.
- An investigation was undertaken with researchers at the Gluck Equine Research Center to determine if the treatment of semen with antibiotics

will prevent the transmission of *T. equigenitalis* to mares bred by artificial insemination. Preliminary results indicated that the antibiotics did prevent the transmission of the disease.

Pathology, general

Neil M. Williams

The UK Veterinary Diagnostic Laboratory pathology section is composed of 8 faculty pathologists, 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. In the course of this, post-doctoral scholars (DVM) are trained in veterinary anatomic pathology.

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

Total Necropsy Cases	4,128 (28% increase over 2010)
Avian	77
Bovine	763
Caprine	81
Equine	1919
Ovine	88
Porcine	20
Small Animal	802
Miscellaneous	45
Laboratory Animal	333

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 34,619 microscopic slides produced. In addition to the routine hematoxylin and eosin stained tissue sections, special and immunohistochemical stains were done resulting in 3,511 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 3,619 cases were processed and examined. A report with diagnosis was produced for each case.

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 456 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 300 submissions from research animals during 2011 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. In addition to providing diagnostic pathology services for research animals, Dr. Coyle is usually involved in providing pathology support for several research projects with individual UK investigators.

Quality Control/Quality Assurance

Mary Harbour

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

The program is based on the American Association of Veterinary Diagnostic Laboratory (AAVLD) requirements, International Standards Organization (ISO 17025) guidelines and Organization of International Epizootics (OIE). The UKVDL Quality /Program also fulfills the university's mission of improving service delivery while achieving excellent human relations (internally and externally), sound leadership, and effective communications.

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 USDA/NAHLN in Ames, Iowa and workshops at the AAVLD Annual meeting. Internal section audits are conducted throughout the year in preparation for the next AAVLD accreditation visit.

Besides the continuous improvement of service, the Quality Assurance Section continues to revise and improve in procedures and policies stay in compliance with the AAVLD Accreditation Requirements. QA section has assisted in implementing all policies and procedures required by National Animal Health Network (NAHLN) and the Veterinarian Laboratory Response Network (Vet-LRN) to include providing documentation, coordinating proficiency testing, participating in workshops and more.

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

- Developed and presented the herd health portion of the new Master Stocker Program in 7 regions of the state impacting approximately 200 farming operations. Updated and presented the herd health portion of Master Cattlemen in 7 regions that directly affected approximately 300 farming enterprises.
- Held two food animal veterinary conferences at the UKVDL which were well-attended and received good reviews. These were offered at no cost to the veterinarians through the generous support of sponsoring pharmaceutical companies.
- Co-sponsored the Small Ruminant Grazing Conference in Elizabethtown that drew 86 participants in 2011. 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.
- Continued to utilize the latest technology (Microsoft Lync) to deliver meetings remotely over the internet resulting in significant savings due to reduced travel expenditures. Beginning to integrate the "Turning Point Technology" into power point presentations so the audience can answer questions by hand held clickers.

- 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.
- Continued a good working relationship with the APHIS Veterinarians to foster cooperation, trust and a bi-directional flow of information from the University to the Federal authorities. This included integration of continuing education modules for federal accreditation into our continuing education programs.
- Worked closely with the State Veterinarian's office to successfully implement state initiatives. This included a cooperative effort to institute the new animal disease traceability regulations and also to formulate the Livestock Standards for KY.
- Worked collaboratively with Purdue, KSU and Berea on multiple small ruminant projects and meetings. Many of these were delivered electronically with open access to the presentations and potentially reaching a wide audience.
- Involved as Co-investigator on a NIFA grant in conjunction with the UKVDL to help food animal veterinarians in the diagnostic decision making process in the field.
- Research of critical problems unique to our state is part of the agenda as the University continues on a path of academic excellence. A research study is in progress to assess trace mineral levels in grazing meat goats. Preliminary results suggest a definite trend of marginal to deficient status which we are currently addressing.
- Completed a 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.
- Worked with dairy extension to deliver "Project Reduce Somatic Cell Count" in 7 regions to help dairy producers deal with the new regulations imposed by the milk processors. This resulted in a co-authored Ag Extension Fact Sheet ID-190 "*Staphylococcus aureus* Mastitis".
- Regularly contributed health related articles for the Ag Extension newsletters "Off the Hoof", "KY Dairy Notes", and the "Goat Producer's Newsletter".
- Submitted material for the KY Veterinary News from the KVMA and the veterinary listserv distributed from the diagnostic laboratory. Spoke at the KVMA Mid-America Veterinary Conference on the topic "What Can Extension Do For You?"

- Researched and provided numerous publications and power point presentations to veterinarians throughout the state to deliver at local producer meetings.

Kentucky veterinarians, extension agents, producers, government entities and the University benefit from a strong livestock sector of which health is a major consideration. In 2011, 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 regarding animal health. This section also performs testing for movement of animals within the United States and for international export purposes. Testing is done by a variety of methods. This section performs a wide range of tests; the tests and numbers listed below are just a sampling of what we offer.

Highlights

Poultry: This section continues to pass annual inspections and maintain status as an NPIP approved laboratory. This year personnel attended National Poultry Improvement Plan (NPIP) approved training courses covering Avian Influenza and Salmonella testing. In 2011 the serology laboratory tested 4,120 samples for antibody to Avian Influenza, 13,045 samples for antibody to *Salmonella pullorum*, 16,876 samples for antibody to both *Mycoplasma gallisepticum*, and *Mycoplasma synoviae*.

Equine: This section successfully passed the annual USDA-APHIS inspection to continue to offer Equine Infectious Anemia (EIA) antibody testing. In 2011, we ran 25,386 EIA tests. The section continues to monitor horses moving through the state stockyards for EIA antibody, testing 11,438 specimens at no charge. The section passed the required NVSL proficiency testing for piroplasmosis testing (*Babesia caballi* and *Theileria equi*), and tested 9,390 specimens for antibodies to *Babesia caballi* and 9,409 specimens for *Theileria equi*. The section also tested 823 serum samples for antibody to Contagious Equine Metritis (CEM-CF). Finally, 2,342 sera were tested for antibodies to the *Leptospira*, serovars *grippotyphosa* and *pomona* by the MAT method. In addition, 1497 sera from 29 states in the US and Ontario, Canada were tested for six leptospira serovars as part of a national sero-epidemiological survey. Results will be published in 2012.

Bovine: The serology section offers a variety of antibody tests that can be performed on serum from bovines and other ruminant species. In 2011 we tested 321 specimens for Anaplasmosis, 380 specimens for antibody to Bluetongue, 469 specimens for antibodies to the Bovine Leukemia Virus, 1,584 serums for Johne's antibodies, and 732 specimens for antibody to *Neospora caninum*. The lab is also active in screening for antibodies to *Brucella abortus*, testing 2,553 sera.

Canine and feline: This section offers a variety of tests that can be run on dogs and cats. A few examples of the testing done in 2011 include 160 for antibodies to histoplasmosis, and 197 samples for antibodies to blastomyces. This section also tested 95 samples from canines for antibody to *Brucella canis*. This is just a sampling of the tests we run for these species.

Porcine: This section also offers testing for swine. In 2011 we tested 51 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 pathology residents, county extension agents, livestock producers, and pet owners. 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 toxins, toxic insects, and bacterial and fungal toxins; and numerous other toxins. Tests are performed in tissues, gastrointestinal contents, biological fluids, baits, feed, water, soil and other substances.

Consultation services include assistance with appropriate sample collection and submission recommendations; determination of appropriate tests to be performed; interpretation of analytical results; therapeutic advice; differential diagnoses; residue considerations; and other general toxicological information. The section personnel consist of Cynthia Gaskill, DVM PhD, Clinical Veterinary Toxicologist; Lori Smith, PhD, Senior Analytical Chemist; Michelle Helm, BSc, chemist/technician, and several student interns.

Highlights

- Hosted student interns for the Forensic Science internship program at Eastern Kentucky University
- Provided analytical support for the University of Kentucky Horse Pasture Evaluation program

- Acquired LC-MS/MS instrumentation through an instrument sharing agreement with the USDA-ARS, FAPRU
- Continued development and validation of new diagnostic tests
- Participated in a number of proficiency testing programs to ensure accuracy and quality control for analytical methods
- Participated in the UKVDL Veterinary Pathology training program; provided lectures on veterinary toxicology and analytical chemistry topics to pathology residents

Participated in several research projects that are directly applicable to improvements in diagnostic offerings. The external funding for these projects help support instrumentation and labor used also for diagnostic purposes. Current projects include:

- Analysis of ocular fluid nitrate and nitrite concentrations in aborted, stillborn, and neonatal foals to establish a normal reference range for this group
- Investigation of the effects of harvest, transport, storage and processing conditions on ergovaline analyses of tall fescue
- Ergovaline concentrations in novel endophyte tall fescue forage
- Effects of fertilization on nitrate concentrations of forages
- Feasibility of using HPLC methodology for quantification of ergovaline in equine serum and placental tissues
- Quantitation of ethylene glycol and glycolic acid in urine by DART-MS
- Analysis of trace elements in liver tissue from aborted, stillborn and neonatal foals to develop normal reference ranges for this group
- Evaluation of whole blood selenium concentrations in central Kentucky goats

Presented research findings, methodology, continuing education programs and seminars at meetings including annual conferences for the American Association of Veterinary Clinical Toxicologists, American Association of Veterinary Laboratory Diagnosticians, University of Kentucky Agriculture and Natural Resources, University of Kentucky Beef Cattle Production Certification program, University of Kentucky Equine Initiative Breeder's Short Course, the University of Kentucky Pasture Please program, the Eastern Kentucky University Department of Chemistry Seminar series, and the University of Kentucky Agricultural Biotechnology Program

In 2011, the toxicology section received samples from more than 900 diagnostic cases, with most cases involving multiple samples such as various tissues, body fluids, forages, baits and other samples, and often involving multiple animals and with multiple test requests per case. The most common tests requested include metal and mineral quantifications in tissues such as liver and kidney; screening of rumen and stomach contents for organic compounds; analysis of tissues for pesticides; and evaluation of forages and feeds for nitrate content, mycotoxins, ionophores, cyanide, and other feed-related toxins. Over

1,000 toxicological consultations were provided for cases in Kentucky and across North America.

Virology

Erdal Erol

This important section performs several virological assays. These assays are important not only for clinical diagnostic cases but also for regulatory cases. Our section performs tests necessary (such as Equine Viral Arteritis-EVA) for export of animals to other states and other countries.

Highlights

Virology sections investigated several disease outbreaks in Kentucky and performed a testing on specimens submitted by practitioners and owners.

Tests performed in this section are as follows (total numbers in the table below): Fluorescent antibody tests (FA) on tissues were performed for Bovine Corona Virus, Bovine Respiratory Syncytial Virus, Bovine Rotavirus, Bovine Viral Diarrhea, Canine Adenovirus, Canine Corona Virus, Canine Distemper Virus, Canine Herpesvirus, Canine Parainfluenza 2, Canine Parvovirus, Equine Herpesvirus 1, Equine Rotavirus, Equine Viral Arteritis, Feline Corona Virus, Feline Herpesvirus, Feline Infectious Peritonitis, Feline Panleukopenia, Parainfluenza-3 Virus, Porcine Circovirus, Porcine Reproductive & Respiratory Syndrome, Porcine Rotavirus, Potomac Horse Fever, Pseudorabies Virus, Swine Influenza Virus, and Infectious Bovine Rhinotracheitis

Virus Neutralization tests were performed for Bovine Respiratory Syncytial Virus, Bovine Viral Diarrhea 1, Bovine Viral Diarrhea 2, Equine Herpesvirus 1, Equine Viral Arteritis, Infectious Bovine Rhinotracheitis, Vesicular Stomatitis IN and Vesicular Stomatitis NJ virus on several thousands of specimens. 7,136 ELISA tests were performed for Bovine Viral Diarrhea Rotavirus and West Nile virus. Finally, 1,099 samples were underwent virus isolation (VI).

The total number of tests performed in the Bacteriology section is provided in this table:

Bovine Corona Virus	99
Bovine Respiratory Syncytial Virus	571
Bovine Respiratory Syncytial Virus	37
Bovine Rotavirus	83
Bovine Viral Diarrhea	7085

Bovine Viral Diarrhea	757
Bovine Viral Diarrhea 1	180
Bovine Viral Diarrhea 2	165
Canine Adenovirus	50
Canine Corona Virus	52
Canine Distemper Virus	155
Canine Herpesvirus	35
Canine Parainfluenza 2	20
Canine Parvovirus	122
Equine Herpesvirus 1	1280
Equine Herpesvirus 1	94
Equine Influenza A1	54
Equine Influenza A2	54
Equine Rotavirus	29
Equine Viral Arteritis	11858
Feline Herpesvirus	16
Feline Infectious Peritonitis	71
Feline Panleukopenia	74
Infectious Bovine Rhinotracheitis	667
Infectious Bovine Rhinotracheitis	98
Influenza A Antigen	171
Parainfluenza-3 Virus	570
Porcine Circovirus	11
Porcine Reproductive & Respiratory Syndrome	14

Potomac Horse Fever	183
Rotavirus	11
Transmissible Gastroenteritis Virus	11
Vesicular Stomatitis IN	707
Vesicular Stomatitis NJ	707
Virus Isolation	1099
West Nile IgM Capture	51

**UK Veterinary Diagnostic Laboratory Faculty and
Professional Veterinary Scientists
2011**

Michelle Arnold, DVM, Ruminant Extension Veterinarian

Bryant, U.K., DVM, Assistant 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

Donahue, J.M., PhD, Professor (post-retirement appointment)

Erdal Erol, DVM MS PhD, Head, Diagnostic Microbiology

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

Hong, C.B., DVM, PhD, DACVP, Professor

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

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

Kennedy, L.A., DVM, Assistant Professor

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:

The Clinical Veterinary Advisor: the Horse. Wilson D., Ed. Toxicology Section
Editor: CL Gaskill. Saunders, St. Louis MO; 2011. 1078 pages

Gaskill C. Toxicological Differential Diagnoses. In: Wilson D, Ed. The Veterinary
Clinical Advisor: the Horse. Saunders, St. Louis MO; 2011: Section III; 885-897

Gaskill C. Basic Treatment of Poisoned Horses. In: Wilson D, Ed. The Veterinary
Clinical Advisor: the Horse. Saunders, St. Louis MO; 2011: Section II; 804-806

Refereed Journal Publications

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. (Accepted for publication to J Equine Vet Sci, Jul
2011).

Kyle R. Kuskie, Jacqueline L. Smith, Samiran Sinha, Craig N. Carter, M. Keith
Chaffin, Nathan M. Slovis, Stuart E. Brown II, Randolph S. Stepusin, Shinji
Takai, Noah D. Cohen: Associations between the Exposure to Airborne Virulent
Rhodococcus equi and the Incidence of *R equi* pneumonia among Individual
Foals. J Equine Vet Sci, 31 (2011) 463-469.

Kyle R. Kuskie, Jacqueline L. Smith, Naisyin Wang, Craig N. Carter, M. Keith
Chaffin, Randolph S. Stepusin, Anthony E. Cattoi, Shinji Takai, Noah D. Cohen:
Effects of farm location and time of day on airborne concentrations of virulent
Rhodococcus equi at two horse breeding farms. Am J Vet Res 2011;72:73-79.

Erdal 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*

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.

John M. Davidson, Jeff D. Ondrak, Arn A. Anderson, Amy K. Swinford, Erdal
Erol. Evaluation of effects of high incubation temperatures on results of
protozoal culture and real-time PCR testing for *Tritrichomonas foetus* inoculated
in a commercially available self-contained culture media system. 2011. JAVMA
239(12) 1589-93

Clavijo A., Erol E., Sung F., Sneed L. and Swinford A. Evaluation of on sample transport conditions and further validation a real-time PCR assay for *Trichomonas fetus*. 2011. 23(5) 982-5, JVDI.

Erol E. Antimicrobial Susceptibility Test, Equine Disease Quarterly, 2011

Evely MM, Donahue JD, Sells SF, and Loynachan AT. 2011. Ocular Mycobacteriosis in a Red-bellied Piranha (*Pygocentrus nattereri*). *J. Fish Diseases* 34(4):323-6.

Miszczak, F, Shuck K M, Lu Z, Go YY, Zhang J, Sells S, Vabre A, Pronost S, Fortier G, Timoney P J., and Balasuriya, UBR. 2011. Evaluation of Two Magnetic Bead-Based Viral Nucleic Acid Purification Kits and Three Real-Time RT-PCR Reagent Systems in Two TaqMan Assays for Equine Arteritis Virus Detection. *J. Clin. Microbiol.* 49(10):3694-6.

Refereed Journal Publications (Under Review)

Smith K, Yanqiu L, Breheny P, Cook RF, Henne P, Sells SF, Pronost S, Zhengchun L, Crossley B, Timoney P, and Balasuriya UB. Development and Validation of a New Allelic Discrimination Real-Time PCR Assay for the Detection of Equine Herpesvirus-1 (EHV-1) and Differentiation of A2254 from G2254 Strains in Clinical Specimens. *J. Clin. Microbiol*

Klein C, Donahue JM, Sells SF, Squires EL, Timoney PJ, Troedsson MHT. 2011. Antibiotic-containing semen extender reduces the risk of dissemination of CEM. *J. Vet. Diagn. Invest.*

Other Publications

Abstracts

Gaskill CL, Smith LL. Ocular fluid nitrate and nitrite concentrations in aborted, stillborn, and newborn equines. Proceedings, 54th Annual Conference of the American Association of Veterinary Laboratory Diagnosticians, Buffalo NY, September 2011, p. 56

Carolyn S, Smith DL, Smith LL, Gaskill CL. Rapid screening of ethylene glycol by direct analysis in real time mass spectrometry (DART-MS) for toxicological samples. American Chemical Society (ACS) Regional Undergraduate Chemistry Poster Competition, University of Kentucky, Lexington KY, April 2011

Kimball S, Schumacher C, Smith DL, Smith LL, Gaskill CL. Rapid screening of ethylene glycol by Direct Analysis in Real Time Mass Spectrometry (DART-MS)

for toxicological samples. Kentucky Academy of Science (KAS) Meeting, Murray State University, Murray KY, November 5, 2011, p.53

Proceedings

Gaskill CL. Treatment of poisoned horses: Basic principles. pp. 50-58. Proceedings, 2nd annual Kentucky Breeder's Short Course, Lexington Kentucky, January 2011

Gaskill CL. Common poisons in beef cattle. 2011 University of Kentucky Agriculture and Natural Resources Update, Winchester Kentucky, October 2011 <http://www.ca.uky.edu/ANR/Agent%20Resources/2011%20Updates/Web%20Agendas%20EAST.htm>

Antimicrobial Susceptibility Patterns of Nocardioform Bacteria Causing Placentitis in Horses. Erol E., Kennedy L., Sells S., Locke S., Smith J., Williams N., Carter C. 2011. AAVLD Meeting 2011, Buffalo, NY.

Nocardioform Placentitis in Horses. L. Kennedy, N. Williams, E. Erol, S. Sells, J. Smith, and C. Carter. AAVLD Meeting, 2011, Buffalo, NY.

Lay Articles

Gaskill CL. Toxin Topic: Landscaping for horse farms. University of Kentucky Bluegrass Equine Digest. May 2011. (online) <http://www2.ca.uky.edu/equine/bed>

Gaskill CL. Toxin Topic: Snakebite in horses. University of Kentucky Bluegrass Equine Digest. July 2011. (online) <http://www2.ca.uky.edu/equine/bed>

Gaskill CL. Research update: Ocular fluid nitrate concentrations in aborted, stillborn, and newborn foals. University of Kentucky Bluegrass Equine Digest. November 2011. (online) <http://www2.ca.uky.edu/equine/bed>

Carter CN: Editor, Diagnostic Laboratory Rounds. Kentucky Veterinary News, Winter, 2011 edition.

Carter CN: Editor, Diagnostic Laboratory Rounds. Kentucky Veterinary News, Fall 2011 edition.

Carter CN: From the Diagnostic Laboratory, Cattle Country News, September issue, 2011.

Carter CN: Editor, Diagnostic Laboratory Rounds. Kentucky Veterinary News, Summer 2011 edition.

Carter CN: Editor, Diagnostic Laboratory Rounds. Kentucky Veterinary News, Spring 2011 edition.

Carter CN: From the Diagnostic Laboratory, Cattle Country News, March issue, 2011.

Extramural Funding

Carter CN, Northington W, Bilderback M, Smith J, Gaskill CL. USDA-NIFA Grant. Mobile wireless and remote diagnostic computer application and animal health briefing capability in support of grazing livestock health. USDA-NIFA \$440,206, 2010-2012

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

Other Research Projects

Gaskill CL. University of Kentucky College of Agriculture. Nitrate and nitrite concentrations in ocular fluid from aborted, stillborn, and neonatal foals. RAA \$1,970. 2011-2012

Gaskill CL. University of Kentucky College of Agriculture Research Activity Award (RAA). Trace element concentrations in liver tissue from aborted, stillborn, and neonatal foals. RAA \$2,263. 2011-2012

Gaskill CL. University of Kentucky College of Agriculture Research Activity Award (RAA). Feasibility of using high performance liquid chromatography for quantification of ergovaline concentrations in serum and placental tissues from horses treated with high dosages of ergovaline. \$2,745. 2011-20-12

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)

Erol E. Antimicrobial Susceptibility Patterns of Yeasts in Horses, Research Activity Award, UK, College of Agriculture (\$3,200), 2011-2012.

Erol E. Leptospirosis and *Salmonella* real-time PCR assay projects- Research Activity Award UK, College of Agriculture, (\$7,000), 2010-2011

Genbank Register

None submitted

Patent's/Copyrights Filed

Continuous animal health monitoring system, patent disclosure, University of Kentucky Van Almen Center, September, 2011. Craig N Carter, Eric S Vanzant, Agricola Odoi, Jacqueline Smith, Cris Anderson.