

# University of Missouri Veterinary Medical Diagnostic Laboratory Annual Report

## – 2014

### ***A Message from the Director***

The Veterinary Medical Diagnostic Laboratory (VMDL) Annual Report - 2014 is a compilation of data from Jan 1, 2014 to Dec 30, 2014. To monitor caseload, testing data from 2010 to 2013 are also included in this report. I hope this report provides you with a basic understanding of laboratory operations and an appreciation for the capacity and capability of our laboratory. I also hope you are encouraged by our achievements in service, teaching, and scholarly activity.

In 2014, several faculty and staff members emerged as section leaders, managers, or program coordinators. The VMDL renewed its membership with National Animal Health Response Network (NALHN) and became a Tier I Lab of Food and Drug Administration Veterinary Response Network (FDA Vet-LRN). The VMDL received 37,666 accessions and performed approximately 85,000 tests. VMDL faculty and staff taught 37 professional, graduate, and undergraduate courses and 17 clinical/diagnostic rounds. VMDL faculty and staff secured a number of extramural (\$500,000) and intramural grants, published 44 peer reviewed papers and 1 book chapter, and gave 36 presentations at regional and national meetings.

In summary, VMDL faculty and staff strive to provide relevant, timely, and cost-effective diagnostic service to our clients and create a positive learning environment for our students. Over the past two years, we have been working closely with the American Association of Veterinary Laboratory Diagnosticians (AAVLD) Accreditation Committee to implement an effective Quality Assurance and Quality Control Program. Significant progress has been made in many areas of our laboratory.

Shuping Zhang, Professor and Director

April 9, 2015

### ***The Veterinary Medical Diagnostic Laboratory (VMDL) Mission Statement***

To provide appropriate and timely diagnostic support to veterinary practitioners, livestock and poultry interests, companion animal interests, wildlife conservationists, and state-federal regulatory officials.

To monitor domestic animals, indigenous wildlife, and zoo animals for diseases that are a threat to livestock health and public health.

To support the teaching mission of the College of Veterinary Medicine.

To create new knowledge through fundamental and translational research.

### ***VMDL Advisory Board Mission Statement***

To advise VMDL management on policies, long-term developmental strategies, and collaborations with relevant university, private, state, national and international organizations.

### ***VMDL Advisory Board Membership***

The Advisory Board consists of 12 members representing the State Veterinarian's office, commodity groups, small animal practice, large animal practice, and the Veterinary Medical Teaching Hospital.

### ***VMDL Advisory Board Members***

Linda Hickam, DVM, State Veterinarian

Tony Martin, DVM, Director of Animal Health, MFA, Inc.

Don Nikodim, Executive Vice President, Missouri Pork Association

Steve Patterson, DVM, Bethel, MO

Kabel Robbins, DVM, Butterball, LLC

Steve Strubberg, DVM, Hermann, MO

Chuck Massengill, DVM, Missouri Cattlemen's Association

Bruce Addison, President of Addison Biological Laboratory, Inc.

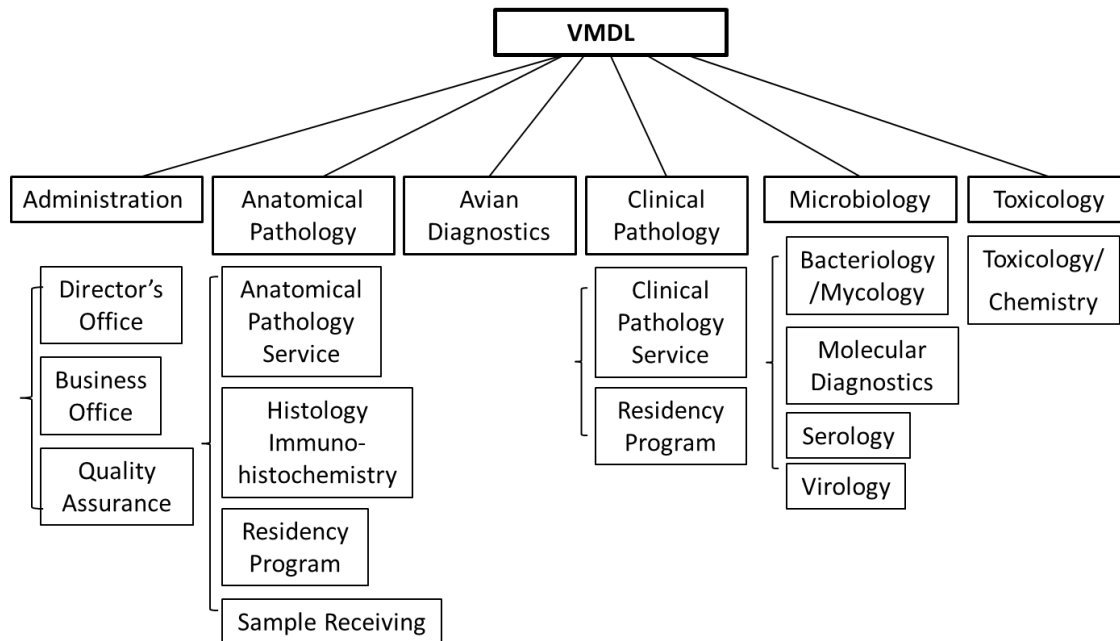
David Wilson, DVM, VMTH Director

Amy DeClue, DVM, VMTH Small Animal Service

Phillip Johnson, DVM, VMTH Equine Service

John Middleton, DVM, VMTH Food Animal Service

## **VMDL Organizational Structure**



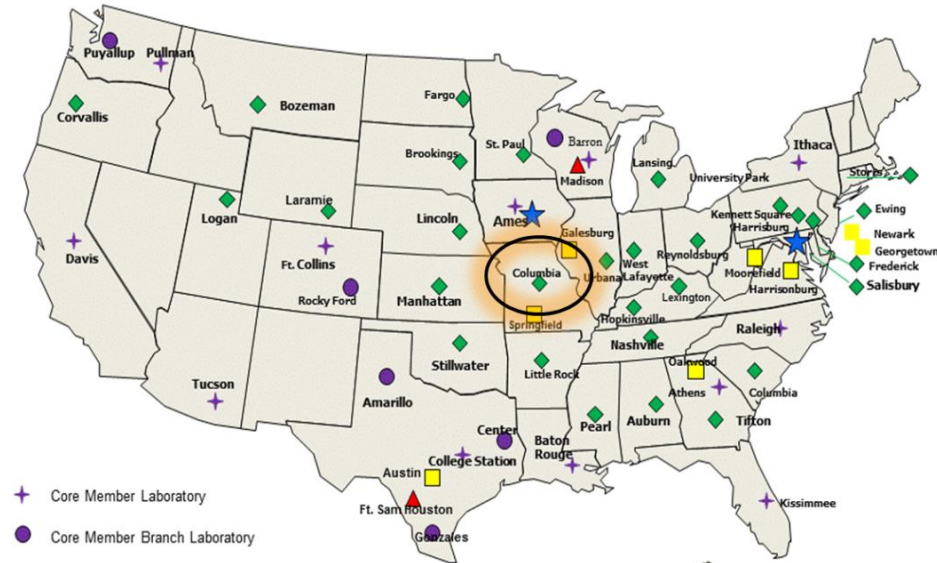
### **VMDL Section Leaders/Managers**

Avian Diagnostics – Dr. Dan Shaw  
 Anatomical Pathology – Dr. Gayle Johnson  
 Bacteriology/Mycology – Dr. Bill Fales/Irene Ganjam  
 Business Office – Mr. Mike Wimmenauer  
 Clinical Pathology – Dr. Marlyn Whitney/ Cheryl Rojas  
 Director’s Office – Ms. Geri Hegstad  
 Histology – Dr. Dae-Young Kim/Candace Kassel  
 Molecular Diagnostics/Serology – Dr. Susan Schommer  
 Quality Assurance – Dr. Tom Reilly/Susan Martin  
 Sample Receiving – Ms. Geri Hegstad  
 Virology – Dr. Jeff Mitchell  
 Toxicology – Dr. Tim Evans

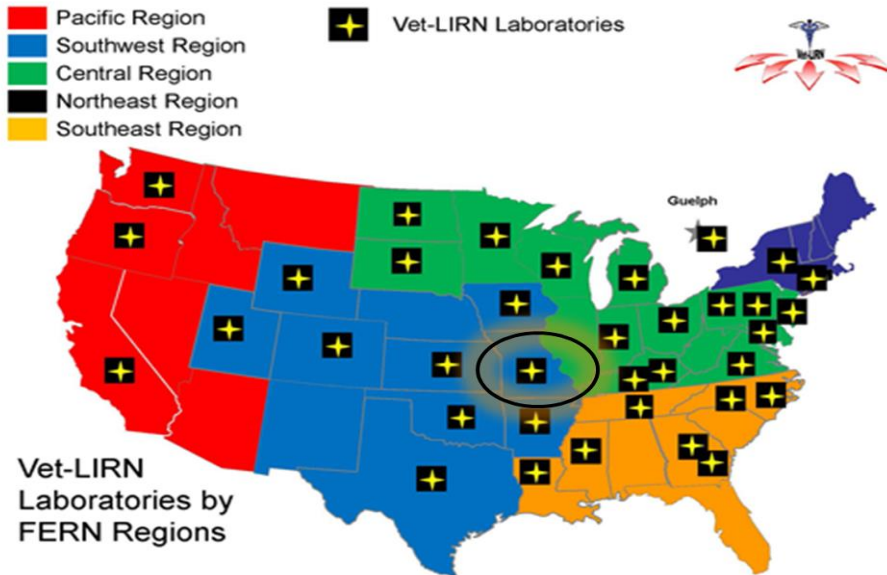
### **VMDL Program Coordinators**

Anatomical Pathology Residency Program – Dr. Kei Kuroki  
 Clinical Pathology Residency Program – Dr. Charles Wiedmeyer  
 Equine Diagnostic Investigations – Dr. Fred Williams III  
 Food Animal Diagnostic Investigations – Dr. Tim Evans  
 Neuropathology and Oncopathology – Dr. Gale Johnson  
 Small Animal Internal Medicine Pathology – Dr. Dae-Young Kim

**VMDL- A Member of National Animal Health Laboratory Network (NAHLN)**



**VMDL - A Tier I Member of FDA Veterinary Laboratory Response Network (VET-LRN)**



## VMDL Service Activities

### Five Year VMDL Clinical Pathology Accession/Specimen/Test

Year	Total	AVIAN	BOVINE	CANINE	CAPRINE	EQUINE	FELINE	MISC	OVINE	PORCINE
2010	12,568	21	129	9,425	49	949	1,833	135	3	24
2011	12,401	16	129	9,484	44	849	1,699	102	66	12
2012	12,792	34	105	9,917	38	943	1,647	78	9	21
2013	13,334	31	71	10,394	46	965	1,728	74	5	20
2014	13,235	72	121	10,422	48	1,009	1,480	46	16	21

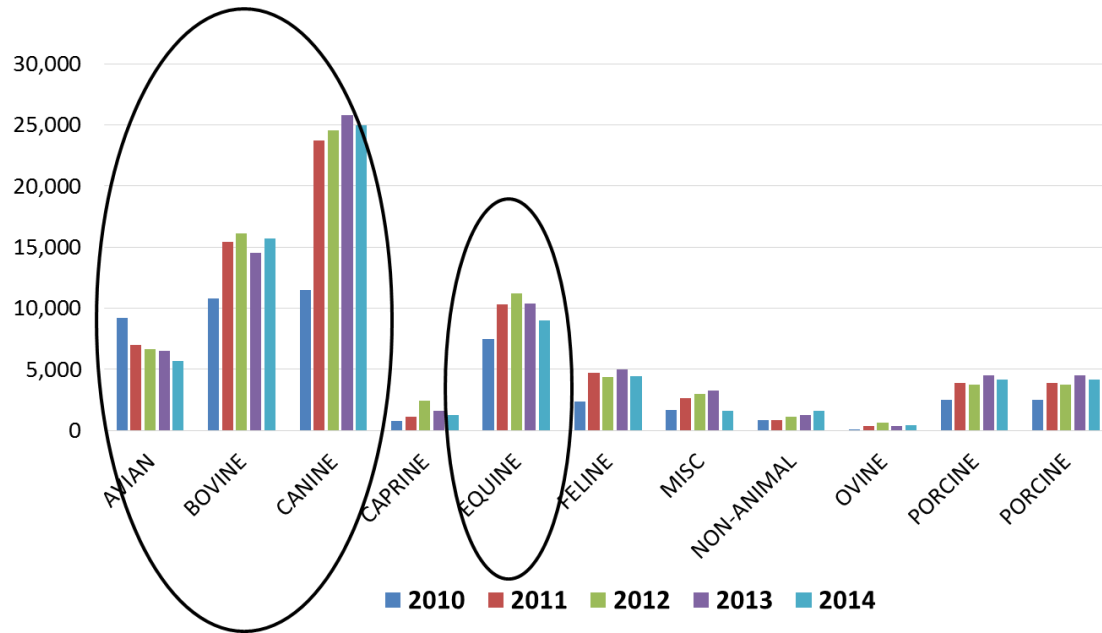
### Five Year VMDL Main Lab Accessions

Year	Accession	Number of Accessions (% of Total)			
		MO	VMTH	Research	Other
2010	24,047	19,443 (81%)	3,169 (13%)	1,344 (6%)	91 (<1%)
2011	24,431	19,791 (81%)	3,516 (14%)	1,402 (6%)	201 (1%)
2012	24,923	19,911 (80%)	3,326 (13%)	1,451 (6%)	235 (1%)
2013	25,165	20,081 (80%)	3,126 (12%)	1,867 (7%)	91 (<1%)
2014	24,431 (-734)	19,733 (81%)	3,241 (13%)	1,378 (6%)	79 (<1%)

### Five Year VMDL Main Lab Specimens by Species

Year	AVIAN	BOVINE	CANINE	CAPRINE	EQUINE	FELINE	MISC	NON-ANIMAL	OVINE	PORCINE
2010	9,235	10,826	11,472	784	7,449	2,395	1,642	853	66	2,488
2011	6,974	15,397	23,734	1,116	10,340	4,707	2,663	843	365	3,891
2012	6,654	16,120	24,555	2,457	11,232	4,396	3,013	1,112	636	3,726
2013	6,523	14,528	25,779	1,603	10,374	5,024	3,267	1,273	356	4,509
2014	5,712	15,685	24,999	1,232	9,029	4,428	3,156	1,576	446	4,185

### Distribution of Specimens by Species



### Five Year VMDL Main Lab Cases (Tests) by Section

(Testing details are available in VMDL Annual Report Saved on CVM Shared Drive)

Year	Avian	Bacti	Clin Path	Ana Path	Molecular	Ser	Vir	Tox
<b>2010</b>	334 (2,426)	5,225 (15,932)	2,994 (6,411)	7,842 (11,187)	2,344 (7,676)	6,535 (15,306)	195 (522)	567 (1,276)
<b>2011</b>	634 (2,247)	9,882 (11,155)	4,605 (4,605)	20,649 (23,115)	7,930 (7,930)	7,837 (12,944)	200 (299)	524 (894)
<b>2012</b>	922 (2,490)	13,525 (19,102)	4,361 (5,258)	18,830 (22,062)	4,978 (9,498)	7,863 (13,723)	291 (491)	749 (1,277)
<b>2013</b>	792 (2,535)	13,937 (18,953)	5,435 (6,789)	20,743 (23,696)	4,821 (7,105)	7,956 (12,464)	244 (515)	682 (1,179)
<b>2014</b>	731 (2,145)	13,585 (17,957)	4,676 (5,397)	20,141 (22,306)	5,051 (7,521)	7,475 (12,994)	268 (588)	889 (1,558)

## **2014 Teaching Activities**

### **Courses (n=40, bold=coordinated by VMDL Faculty)**

<b>BioMed 3200</b>	Comparative Hematology, On-line
AS 140/2140	Companion Animals
AS 325/4977	Horse Production
AS 440/9001	Mycotoxins
AS 4978	Swine Production
BIOMED 3310	Equine Health Topics (3)
<b>BioMed 4100</b>	Veterinary Clinical Chemistry, On-line (3)
BioMed 4110/VPB 7110	Veterinary Cytology Semester-based (2)
BioMed 4120	Principles of Toxicology Semester-based (3)
MMI 8040	Mechanisms of Microbial Pathogenesis
P_HLTH 8001	Applied Epidemiology (3)
V_PBio 7120	Principles of Toxicology (3)
VBMS 5506	Veterinary Cellular Biology and Molecular Biology – Part 1 (2)
VBMS 5507	Veterinary Pharmacology (3)
VBMS 5508	Veterinary Pharmacology (2)
VBMS 5509	Veterinary Toxicology (3)
Vet Med 402D	Grand Rounds
Vet Med 8402B	Neurology Journal Club
Vet Med 8402D	Clinicopathologic Case Conference
VMS 6400	Food Animal Medicine and Surgery I (6)
VMS 6720	Equine Medicine, Surgery, or Ambulatory Practice (2-6)
VMS 6987	Problem-Based Clinical Preparation (1)
VMS 6996	Advanced Dermatology (1)
VMS 8036	Advanced Physiology of Dog and Cat (2)
VMS 8415	Advanced Veterinary Internal Medicine-Neurology (2).
VMS 8485	Problems in Veterinary Clinical Sciences (1-3)
VPB 5552	Veterinary Bacteriology I (3)
VPB 5553	Veterinary Bacteriology II (2.5)
VPB 5554	Veterinary Virology (2.5)
VPB 5575	General Veterinary Pathology (3)
<b>VPB 5576</b>	Veterinary Systemic and Special Pathology I (3)
<b>VPB 5577</b>	Veterinary Systemic and Special Pathology II (3)
<b>VPB 5578</b>	Veterinary Clinical Pathology (3)
<b>VPB 6647</b>	Diagnostic Pathology and Special Species Medicine (8)
<b>VPB 6679</b>	Diagnostic Pathology and Special Species Medicine II (3-6)
VPB 8411	Seminar in Histopathology (1)
VPB 8432	Advanced Histopathology (5)
<b>VPB 8434</b>	Advanced Clinical Pathology (4)
VPB 8435	Advanced Microscopy in Veterinary Clinical Pathology (1)
<b>VPB 8436</b>	Pathogenic Mechanisms in Veterinary Pathobiology (3)

### **Student Mentoring/Diagnostic Rounds (n=20)**

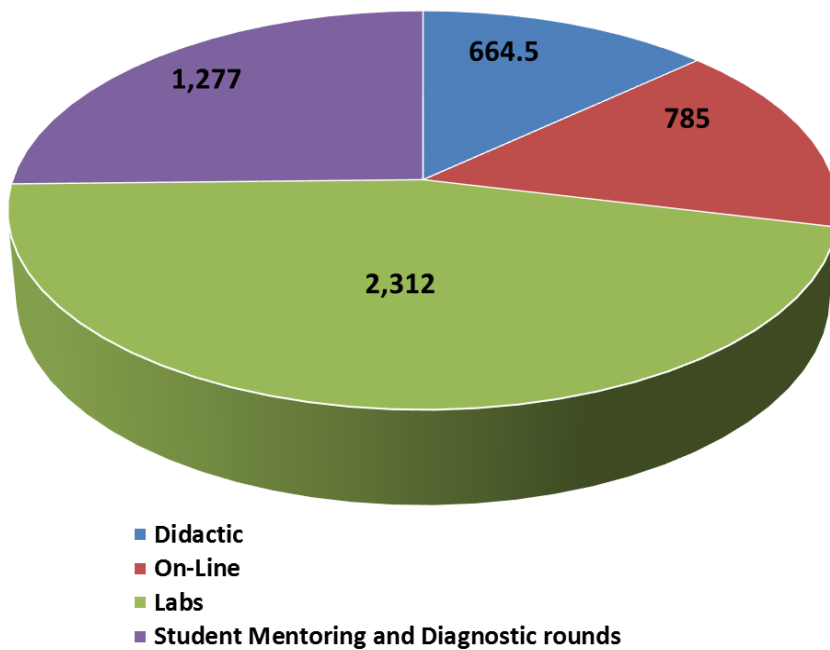
Chemistry Rounds 1 hour/week

Clinical Pathology Journal Club 1 hour/week

Comparative Orthopaedic Laboratory (COL) journal club  
 Cytology Rounds 1 hour/week  
 Dermatology Rounds  
 Dermatopathology Rounds ½ hour every other week  
 Equine House Officers  
 Follow-up round  
 Food for Thought Rounds 1 hour every 6-8 weeks  
 Graduate Student Mentoring  
 Hematology Rounds 1 hour every 6-8 weeks  
 Image Review 1 hour every 6-8 weeks  
 Joint Pathology Center Wednesday Slide Conference  
 Ophthalmic Pathology Rounds 1 hour/month  
 Pathology/Oncology Rounds 1 hour/week  
 Pre-vet Mentoring  
 Treat Rounds (Histopathology) 1 hour every other week  
 Veterianry Research Scholars Program  
 VMDL-Food Animal Monthly Rounds  
 VMDL-VMTH Pathology weekly Rounds

**Student Contact Hours (n=5,039 )**

**Distribution of Student Contact Hours**





## 2014 Scholarly Activities

### Extramural Funding to MU VMDL

(Total Dollar Amount≈\$504,549)

1. Casteel, S. PI. Arsenic Bioavailability In Mine Waste. 2009 – 2014. \$36,433.
2. Casteel, S. PI. Vaccine Trial (CEVA, inc.) 2014 – 2015. \$165,976
3. Casteel, S. PI. Bioavailability Study at IR Site 22 (Former Naval Weapons), 2014 – 2015. \$56,509
4. Casteel, S. PI. Small Mammal Study Pb Mining Contaminant Sites, 2014-2015, \$54,647
5. Kuroki, K. Co-I and Bozynski, CC. Co-I. Assessment of an Impact Model for Subchondroplasty Treatment in Dogs 2013-2014 \$ 6,128
6. Kuroki, K. Co-I and Bozynski, CC. Co-I. Viability of fresh osteochondral tissue after storage in Mizzou Media for up to 70 days. 2013 – 2015. \$2,885.
7. Kuroki, K. Co-I and Bozynski, CC. Co-I. Use of ACP injections for improved ACL and meniscal healing. 2014 – 2015. \$10,073.
8. Kuroki, K. Co-I. Pivotal Anchor Study
9. Rottinghaus GE. Co-PI. MU Center for Botanical Interaction Studies. NIH, \$10,246,711, 2010-2014 (Co-I 10% effort).
10. Rottinghaus, GE. Co-PI. Comparison of aflatoxin rapid screening test kits to quantitative HPLC results for corn gluten feed, gluten meal and corn germ meal. US Corn Refiners, 2013-2015 (\$8,000).
11. Rottinghaus GE. Co-PI. Ergovaline concentrations in tall fescue samples from test plots in Kentucky and Georgia. AgResearch USA Limited, 2015. (\$21,000).
12. Rottinghaus GE. Co-PI. Aflatoxin metabolites in dairy milk, feces, urine, and rumen fluid. University of Illinois 2015. Subcontract (\$14,000).
13. Zhang, S. PI. Maintaining Membership Laboratory Requirements 2014-2015. Total direct: \$5,000
14. Zhang, S. PI. USDA/APHIS Swine Surveillance. 2014-2015. Total direct: \$8,275
15. Zhang, S. PI. FDA CVM Vet-LRN Vet Diagnostic Lab Program. Total: 2014-2015. Total Direct: \$ 15,000
16. Zhang, S. PI. Pathogens of Bobwhite Quail. Rollins Plains Quail research Foundation. 2014-2015. \$38,000.

### Intramural Grants to VMDL

1. Raghuraman Kannan (PI), Kim, DY (Co-PI). Non-Invasive Imaging Of Sentinel Lymph Nodes In Melanoma: Multifunctional Radio Fluorescent Nanoconjugates (MRFn) Agency: Mizzou Advantage, 2014-2016. Amount: \$55,000; 5%,
2. Johnson, PJ (PI), Wiedmeyer, CE (Co-I), Bukoski, A (Co-I), Whelchel, D (Co-I), Evans, T (Co-I) Development of a lithium chloride continuous rate infusion protocol for the prevention of acute laminitis in horses, USDA Animal Health Formula Funds, \$13,202. 02/19/2015 – 01/25/2016

### Publications (n=44)

1. Bordin K, Rosim RE, Neeff DV, **Rottinghaus GE**, Oliveira CA. 2014. Assessment of dietary intake of fumonisin B<sub>1</sub> in São Paulo, Brazil. Food Chem. 155:174-8.
2. Calcutt, M.J., M.F. Foecking, N.T. Martin, T. Mhlanga-Mutangadura, and **T.J. Reilly**. 2014. Draft Genome Sequence of *Moraxella bovoculi* Strain 237T (ATCC BAA-1259T) Isolated from a Calf with Infectious Bovine Keratoconjunctivitis. Genome Announc. 2(3). pii: e00612-14. doi: 10.1128/genomeA.00612-14. PMID: 2497083

3. Calcutt MJ, Foecking MF, Mhlanga-Mutangadura T, **Reilly TJ**. 2014. Genome Sequence of *Actinobacillus suis* Type Strain ATCC 33415T. *Genome Announc.* 2 (5). pii: e00926-14. doi: 10.1128/genomeA.00926-14. PMID: 25237027
4. Cook, J.L., C.R. Cook, J.P. Stannard, G. Vaughn, N. Wilson, Bncbi. L. Roller, A.M. Stoker, P. Jayabalan, M. Hdeib, and **K. Kuroki**. 2014. MRI versus Ultrasonography to Assess Meniscal Abnormalities in Acute Knees. *J. Knee Surg.* PMID: 24474166
5. Cook JL, Hung CT, **Kuroki K**, Stoker AM, Cook CR, Pfeiffer FM, Sherman SL, Stannard JP. 2014. Animal models of cartilage repair. *Bone Joint Res.* 3(4):89-94. PMID: 24695750
6. Cook JL, **Kuroki K**, **Bozynski CC**, Stoker AM, Pfeiffer FM, Cook CR. 2014. Evaluation of synthetic osteochondral implants. *J Knee Surg.* 27(4):295-302. PMID: 2428198
7. Cook JL, Stoker AM, Stannard JP, **Kuroki K**, Cook CR, Pfeiffer FM, **Bozynski C**, Hung CT. 2014. A novel system improves preservation of osteochondral allografts. *Clin Orthop Relat Res.* 472(11):3404-3414. PMID: 25030100
8. Gilliam, D., D.P. O'Brien, J.R. Coates, G.S. Johnson, **G.C. Johnson**, T. Mhlanga-Mutangadura, L. Hansen, J. Taylor, and R. Schnabel. 2014. A Homozygous KCNJ10 Mutation in Jack Russell Terriers and Related Breeds with Spinocerebellar Ataxia with Myokymia, Seizures, or Both. *J. Vet. Intern. Med.* 28(3):871-877. PMID: 24708069
9. Gubin, M.M., P. Techasintana, J.D. Magee, G.M. Dahm, R. Calaluce, J.L. Martindale, **M.S. Whitney**, C.L. Franklin, C. Besch-Williford, J.W. Hollingsworth, K. Abdelmohsen, M. Gorospe, and U. Atasoy. 2014. Conditional knockout of the RNA-binding protein HuR in CD4+ T cells reveals a gene dosage effect on cytokine production. *Mol. Med.* 20:93-108. PMID: 24477678
10. Guo J, Payne S, **Zhang S**, Turner D, Tizard I, and Suchodolski P. 2014. Avian Bornaviruses: Disease diagnosis, isolation, and genotyping. *Curr Protoc Microbiol* 34:151.1.1-151.1.33.
11. Hilligas J, van Wie J, Barr J, Russell KE, Perry AL, Weeks BR, **Zhang S**. 2014. Vertebral Osteomyelitis and Multiple Cutaneous Lesions in a Dog Caused by *Nocardia pseudobrasiliensis*, a Novel Species in Veterinary Medicine. *J Vet Intern Med* 28(5):1621-5.
12. Jiang J, Chuang DY, Zong Y, Patel J, Brownstein K, Lei W, Lu CH, Simonyi A, Gu Z, Cui J, **Rottinghaus GE**, Fritsche KL, Lubahn DB, Folk WR, Sun GY. 2014. *Sutherlandia frutescens* ethanol extracts inhibit oxidative stress and inflammatory responses in neurons and microglial cells. *PLoS One.* 2014 Feb 25;9(2):e89748
13. **Johnson, G.C.**, J.R. Coates, and F. Winger. 2014. Diagnostic immunohistochemistry of canine and feline intracalvarial tumors in the age of brain biopsies. *Vet. Pathol.* 51(1):146-160. PMID: 24280940
14. Kaufman KL, Mann FA, **Kim DY**, Lee S, Yoon HY. 2014. Evaluation of the effects of topical zinc gluconate in wound healing. *Vet Surg.* 43(8):972-982. PMID: 25077551
15. Kuhns CA, Cook CR, Dodam JR, Leach SB, **Kuroki K**, Jenkins TJ, Tallmage AM, Hoernschemeyer DG. 2014. Injectable Gelatin utilized as Hemostatic Agent to Stop Pedicle Bleeding in Long Deformity Surgeries - Does it Embolize? *Spine (Phila Pa 1976)*. [Epub ahead of print]. PMID: 25494314
16. Lee K, Kwon DN, Ezashi T, Choi YJ, Park C, Ericsson AC, Brown AN, Samuel MS, Park KW, Walters EM, **Kim DY**, Kim JH, Franklin CL, Murphy CN, Roberts RM, Prather RS, Kim JH. 2014. Engraftment of human iPS cells and allogeneic porcine cells into pigs with inactivated RAG2 and accompanying severe combined immunodeficiency. *Proc Natl Acad Sci U S A.* 2014 May 20;111(20):7260-7265. PMID: 24799706
17. Leissinger MK, Garber JB, Fowlkes N, Grooters AM, **Royal AB**, Gaunt SD. 2014. *Mycobacterium fortuitum* lipid pneumonia in a dog. *Vet Pathol.* [Epub ahead of print]. PMID: 24788402

18. McKelvey JA, Yang M, Jiang Y, **Zhang S**. 2014. *Salmonella enterica* serovar *enteritidis* antimicrobial peptide resistance genes aid in defense against chicken innate immunity, fecal shedding, and egg deposition. *Infect Immun*. 82(12):5185-202. PMID: 25267840
19. Mobley CB, Toedebusch RG, Lockwood CM, Heese AJ, Zhu C, Krieger AE, Cruthirds CL, Hofheins JC, Company JM, **Wiedmeyer CE, Kim DY**, Booth FW, Roberts MD. 2014. Herbal adaptogens combined with protein fractions from bovine colostrum and hen egg yolk reduce liver TNF- $\alpha$  expression and protein carbonylation in Western diet feeding in rats. *Nutr Metab (Lond)*. 11:19. doi: 10.1186/1743-7075-11-19. PMID: 24822076
20. Morgan, B.R., J.R. Coates, **G.C. Johnson**, G.D. Shelton, and M.L. Katz. 2014. Characterization of thoracic motor and sensory neurons and spinal nerve roots in canine degenerative myelopathy, a potential disease model of amyotrophic lateral sclerosis. *J. Neurosci. Res*. 92(4):531-541. PMID: 24375814
21. Morris EM, Jackman MR, **Johnson GC**, Liu TW, Lopez JL, Kearney ML, Fletcher JA, Meers GM, Koch LG, Britton SL, Rector RS, Ibdah JA, MacLean PS, Thyfault JP. 2014. Intrinsic aerobic capacity impacts susceptibility to acute high-fat diet-induced hepatic steatosis. *Am J Physiol Endocrinol Metab*. 307(4):E355-64. doi: 10.1152/ajpendo.00093.2014. PMID: 24961240
22. Norman TE, Batista M, Lawhon SD, **Zhang S**, Kuskie KR, Swinford AK, Bernstein LR, and Cohen, ND. 2014. In vitro susceptibility of equine-obtained isolates of *Corynebacterium pseudotuberculosis* to gallium maltolate. *JCM*. 52(7): 2684-2685.
23. Olias P, Maier K, Wuenschmann A, Reed L, Armién AG, **Shaw DP**, Gruber AD, Lierz M. 2014. *Sarcocystis calchasi* has an expanded host range and induces neurological disease in cockatiels (*Nymphicus hollandicus*) and North American rock pigeons (*Columbia livia* f. dom.). *Vet Parasitol*. 200(1-2):59-65. PMID: 24360290
24. Osterbur K, Mann FA, **Kuroki K**, DeClue A. 2014. Multiple organ dysfunction syndrome in humans and animals. *J Vet Intern Med*. 28(4):1141-1151. Epub 2014 Apr 28. PMID: 24773159
25. Ota-Kuroki J, Ragsdale JM, Bhupinder B, Wakamatsu N, **Kuroki K**. 2014. Intraocular and periocular lymphoma in dogs and cats: A retrospective review of 21 cases (2001-2012). *Vet Ophthalmol*. 17:389-396. PMID: 24118744.
26. Peng Y, Schoenlaub L, Elliott A, **Mitchell WJ**, Zhang G. 2014. Characterization of a lipopolysaccharide-targeted monoclonal antibody and its variable fragments as candidates for prophylaxis against the obligate intracellular bacterial pathogen *Coxiella burnetii*. *Infect Immun*. 82(11):4530-4541. PMID: 25114119
27. Pfeiffer FM, Smith MJ, Cook JL, and **K. Kuroki**. 2014. The histologic and biomechanical response to two commercially available small glenoid anchors for use in labral repairs. *J. Shoulder Elbow Surg*. 23(8):1156-1161. PMID: 24725901
28. **Reilly TJ**, Calcutt MJ, Wennerdahl LA, **Williams F 3rd, Evans TJ**, Ganjam IK, Bowman JW, **Fales WH**. 2014. Isolation of *Aureimonas altamirensis*, a *Brucella canis*-like bacterium, from an edematous canine testicle. *J Vet Diagn Invest*. 26(6):795-798. PMID: 25292192
29. Roberts MD, Toedebusch RG, Wells KD, Company JM, Brown JD, Cruthirds CL, Heese AJ, Zhu C, **Rottinghaus GE**, Childs TE, Booth FW. 2014. Nucleus accumbens neuronal maturation differences in young rats bred for low versus high voluntary running behaviour. *J Physiol*. 15;592(Pt 10):2119-35. doi: 10.1113/jphysiol.2013.268805
30. Roller BL, Monibi FA, Stoker AM, **Kuroki K**, Bal BS, Cook JL. 2014. Characterization of Knee Meniscal Pathology: Correlation of Gross, Histologic, Biochemical, Molecular, and Radiographic Measures of Disease. *J Knee Surg*. [Epub ahead of print]. PMID: 24807193
31. Schrauwen I, Barber RM, Schatzberg SJ, Siniard AL, Corneveaux JJ, Porter BF, Vernau KM, Keesler RI, Matiasek K, Flegel T, Miller AD, Southard T, Mariani CL, **Johnson GC**, Huentelman MJ. 2014. Identification of novel genetic risk loci in Maltese dogs with necrotizing meningoencephalitis and

- evidence of a shared genetic risk across toy dog breeds. PLoS One. 9(11):e112755. doi: 10.1371/journal.pone.0112755. PMID: 25393235
32. Sharpe SJ, Meadows RL, Senter DA, **Kuroki K**. 2014. Pathology in practice. Liver malignancy and paraneoplastic alopecia in a cat. J Am Vet Med Assoc. 244(11):1265-1267. PMID: 24846425
  33. Spoor MS, Flesner BK, Trzil JE, **Whitney MS, Shaw DP**, Selting KA. 2014. What is your diagnosis? Intra-abdominal mass in a female spayed dog. Vet Clin Pathol. 43(1):109-110. PMID: 24313736
  34. Su H, McKelvey J, Rollins D, **Zhang MZ**, Brightsmith D, Derr D, **Zhang S**. 2014. Cultivable Bacterial Microbiota of Northern Bobwhite (*Colinus virginianus*): A New Reservoir of Antimicrobial Resistance? PloS One 9(6): e99826
  35. Stoffel RT, McClure JC, Butcher MM, Johnson GC, Roland W, Cheng C, Sirigireddy KR, Ganta R, Boughan K, Ewing SA, Stich RW. 2014. Experimental infection of *Rhipicephalus sanguineus* with *Ehrlichia chaffeensis*. Vet Microbiol. 172(1-2):334-8. doi:10.1016/j.vetmic.2014.04.017.
  36. Thachil AJ, **Shaw DP**, Nagaraja KV. 2014. Effects of dexamethasone immunosuppression on turkey clostridial dermatitis. Avian Dis. 2014 58(3):433-436. PMID: 25518439
  37. Uguz C, Varisli O, Agca C, **Evans T**, Agca Y. 2014. *In vitro* effects of nonylphenol on motility, mitochondrial, acrosomal and chromatin integrity of ram and boar spermatozoa. Andrologia. doi: 10.1111/and.12346. [Epub ahead of print]. PMID: 25280247
  38. Vuillemenot BR, Kennedy D, Cooper JD, Wong AMS, Sri Sarmi, Doeleman T, Katz ML, Coates JR, Johnson GC, Reed R, Adams E, Butt M, Musson D, Henshaw D, Henshaw J, Keve S, Cahayag R, Tsuruda LS, O'Neill CA. 2014. Nonclinical profile of CNS-administered enzyme replacement in canine CLN2 neuronal ceroid lipofuscinosis. Mol Genet Metab. S1096-7192 (14)
  39. **Wiedmeyer, C.E.**, J.P. Crossland, M.J. Dewey, M.R. Felder, S.C. Barlow, P.B. Vrana, and G. Szalai. 2014. Comparative Hematological and Serum Biochemical Values among *Peromyscus* Species and Their Hybrids. J. Am. Assoc. Lab. Animal Sci.
  40. **Wiedmeyer, C.E.**, T.J. Fangman, K. Schwartz, and B. Payne. 2014. Fine Needle Aspiration and Cytology as an Alternate Method for Evaluating Injection Site Lesions. J. Swine Health Prod.
  41. Winter RL, Gordon SG, **Zhang S**, Hariu CD, Miller MW. 2014. Mural endocarditis caused by *Corynebacterium mustelae* in a dog with a ventricular septal defect. JAAHA. 50(5):366-72.
  42. Zeng, R., J.R. Coates, **G.C. Johnson**, L. Hansen, T. Awano, A. Kolicheski, E. Ivansson, M. Perloski, K. Lindblad-Toh, D.P. O'Brien, J. Guo, M.L. Katz, and G.S. Johnson. 2014. The Breed Distributions of *SOD1* Alleles Previously Associated with Canine Degenerative Myelopathy. J Vet. Intern. Med. 28(2):515-521. PMID: 24524809
  43. Zhang X, Yu Z, **Zhang S**, and He K. 2014. Immunization with H7-HCP-Tir-Intimin significantly reduces colonization and shedding of *Escherichia coli* O157:H7 in goats. PLoS One. 9(3): e91632
  44. Zhao L, **Zhang MZ**, and **Zhang S**. 2014. Expression, purification and comparative in vitro characterization of avian beta-defensin-2, -6, and -12. Avian Dis. 58(4):541-9.

### Book Chapter (1)

1. Eric Gingerich, and **Daniel Shaw**. Chapter 13. Reproductive Diseases in Backyard Poultry Medicine and Surgery: A Guide for Veterinary Practitioners, [Cheryl B. Greenacre](#), [Teresa Y. Morishita](#), eds. Wiley-Blackwell, December 2014.

### Presentations (n=41)

1. Ahner CE, Monibi FA, **Bozynski CC**, Stoker AM, Cook JL. Serum protein biomarkers in a novel canine model for partial ACL tear and medial meniscal release. University of Missouri's Health Sciences Research Day. Columbia, MO. November 13, 2014.
2. **Casteel, Stan W**. "The Natural World of Chemical Warfare." Western Veterinary Conference, Las Vegas, NV. February 17, 2014.

3. **Casteel, Stan W.** "Basic Principles of the Use of Biological Agents." (Part 1 and Part 2—3.5 hours). Whitley County Government Center, Columbia City, IN. February 11, 2014.
4. **Casteel, Stan W.** "Basic Principles on the Use of Biological Agents." (3.5 hours) United States Attorney's Office, 450 Golden Gate Avenue, San Francisco, CA. May 28-29, 2014.
5. **Casteel, Stan W.** "Biological Agents, Effects, and Treatment." (3 hours) United States Attorney's Office, 450 Golden Gate Avenue, San Francisco, CA. October 15-16, 2014.
6. **Casteel, Stan W.** "Community Response to Biological Incidents." (3 hours) Whitley County Government Center, Columbia City, IN. February 12, 2014.
7. **Casteel, Stan W.** "Fire-related Intoxications and Outcomes." Western Veterinary Conference, Las Vegas, NV. February 17, 2014.
8. **Casteel, Stan W.** "Food-related Hazards for Pets." Western Veterinary Conference, Las Vegas, NV. February 17, 2014.
9. **Casteel, Stan W.** "Is It a Poison or Something Else? How Do You Know for Sure" Western Veterinary Conference, Las Vegas, NV. February 17, 2014.
10. **Casteel, Stan W.** "Poisons Targeting the Liver and Nervous System." Western Veterinary Conference, Las Vegas, NV. February 17, 2014.
11. **Casteel, Stan W.** "Poisons That Target the Finicky Feline." Western Veterinary Conference, Las Vegas, NV. February 17, 2014.
12. Chance, D. L., **Reilly, T. J.**, and Mawhinney, T. P. (2014). Microwave-Assisted High Resolution Imaging in the study of Bacterial colony organization of Individual and Co-colonizing species. Presentation at American Society for Microbiology Cell communication Conference October 2014.
13. Cook JC, **Bozynski CC**, Hanypsiak B, Stannard JP, Smith P, **Kuroki K**, Stoker AM, Cook CR. Optimizing acute management of ACL tears using a dog model. The 14<sup>th</sup> Annual Comparative Orthopaedics Day, Columbia, MO, April 25, 2014.
14. Cooper, M, Hooper, S, Amelon, S and **Wiedmeyer, CE**. Hematologic and Electrolyte Changes in Little Brown Bats Treated for White Nose Syndrome. Veterinary Research Scholars Symposium, Ithaca, NY.
15. **Erin Burton** (presenter), **Mitchell W, Royal A**. Hemophagocytic histiocytic sarcoma in a dog. MAVP (Midwest Association of Veterinary Pathologists) in Madison WI, 2014
16. **Fales, WH, Bowman, JW, Ganjam, IK, Kim Dae Young, Schummer, S**, Calcutt, MJ, **Reilly, T**. Isolation and Identification of *Helcococcus ovis* from Bovine Joint Fluid 2014. 57th Annual Conference American Association of Veterinary Laboratory Diagnosticians, Kansas City, MO
17. Francis, J. and **Schommer, S**. A Quantitative Examination of real-time PCR Sensitivity to Bovine *Tritrichomonas fetus*. Poster at Meril Scholars National Symposium . Ithica, New York. August 1-3, 2014
18. **Hancock, TS** and **Wiedmeyer, CE**. Isolation and Characterization of Urinary Exosomes in Rodent Models of Disease. Phi Zeta Research Day, Columbia, MO.
19. Hanson, S and **Wiedmeyer, CE**. Likelihood of Prediabetes in NHANES 2007-2012 from Chemical Exposure. Phi Zeta Research Day, Columbia, MO.
20. Husby KA, Reed SK, Cook JL, Wilson DA, **Kuroki K**, Keegan KG, Middleton JR. Evaluation of a synthetic osteochondral implant for surgically created subchondral bone defects of the medial femoral condyle in normal horses. American College of Veterinary Surgeons Veterinary Symposium, San Diego, CA. Oct. 15-18, 2014.
21. Husby KA, Reed SK, Cook JL, Wilson DA, **Kuroki K**, Keegan KG, Middleton JR. Evaluation of a synthetic osteochondral implant for surgically created subchondral bone defects of the medial femoral condyle in normal horses. World Veterinary Orthopaedic Congress. Breckenridge, CO. Mar. 1-8, 2014.

22. **Johnson GC**, and the Comparative Neurology Group. Selected Heritable CNS Diseases in Dogs. Western Conference of Veterinary Pathologists, Saskatoon, Saskatchewan, Canada, Oct 3, 2014. Invited conference moderator.
23. **Johnson GC**, Coates JR, O'Brien DP, Katz ML, Johnson GS. Degenerative Myelopathy of Old Dogs. Invited speaker, research discussion, University of Saskatchewan, Saskatoon, Saskatchewan, Canada, Oct 2, 2014
24. **Johnson GC**, Coates JR, O'Brien DP, Katz ML. Recent Adventures in Neuropathology: Brain Biopsy and Gene Therapy Lesions. Invited speaker, research discussion, University of Saskatchewan, Saskatoon, Saskatchewan, Canada, Oct 2, 2014
25. **Johnson GC**. Resident Neuropathology Review (8 hours). Washington State University, Pullman, WA. Nov 20, 2014.
26. **Kim DY** (invited): Equine diseases. Animal and Plant Quarantine Agency, South Korea, June, 2014
27. **Kuroki K**. Basic veterinary pathology practice. Aug. 7, 2014. Nihon University, Kanagawa, Japan.
28. **Kuroki K**. Kennedy CR, Stoker AM, Cook JL. In vitro effects of oxidized low density lipoprotein on joint health. ACVP and ASVCP annual meeting. Paper #E-39. Atlanta, GA. Nov. 8-12, 2014.
29. Mckelcey, J., Yang, M., Jiang, L. **Zhang, S**. *Salmonella enterica* serovar enteritidis antimicrobial peptide resistance genes aid in defense against chicken innate immunity, fecal shedding, and egg deposition. Missouri Branch ASM 2014.
30. Monibi FA, Sherman SL, Cook CR, **Kuroki K**, Pfeiffer FM, Stoker AM, **Bozynski CC**, Cook JL. Development and validation of a novel in vivo model of post-traumatic osteoarthritis. University of Missouri's Health Sciences Research Day. Columbia, MO. November 13, 2014.
31. Monibi FA, Pfeiffer FM, Stoker AM, **Kuroki K**, Sherman SL, Cook JL. Genipin effects on cell viability and mechanical properties of a biological scaffold intended for meniscal tissue engineering. 37th Annual Phi Zeta Research Day. Columbia, MO. May 9, 2014.
32. Nelson SR, Lopes MAF, **Kim DY**, **Wiedmeyer CE**, Johnson PJ. Incretin-secreting K and L cells in the equine small intestine. 2014 Meril NIH National Veterinary Scholars Symposium, Jul 31 – Aug 3, 2014. Cornell University, Ithaca, NY
33. Nelson, SR, Lopes, MAF, **Kim, DY**, **Wiedmeyer, CE** and Johnson, PJ. Incretin-Secreting K and L Cells in the Equine Small Intestine. Veterinary Research Scholars Symposium, Ithaca, NY.
34. **Piech T** (presenter), **Royal A**. Eccentricity in a DKA dog. MAVP (Midwest Association of Veterinary Pathologists) in Madison WI, 2014
35. Ragsdale J, Takacs N, **Kuroki K**. Malignant jugulotympanic paraganglioma in a dog. ACVP and ASVCP annual meeting. Paper #D-45. Atlanta, GA. Nov. 8-12, 2014.
36. Schroepfer E, Tomkovitch J, Wolfe M, **Wiedmeyer CE**, Bukoski A, DeClue AE, **Evans TJ**, Johnson PJ. Effect of lithium chloride on inflammatory processes in the adult horse: neutrophil phagocytosis and oxidative burst capacity assessed using flow cytometry. Phi Zeta Research Day, Columbia, MO.
37. Smith P, Cook JL, Stannard JP, Pfeiffer FM, **Kuroki K**, **Bozynski CC**, Cook CR. Suspensory vs screw fixation for ACL reconstruction. The 14<sup>th</sup> Annual Comparative Orthopaedics Day, Columbia, MO, April 25, 2014.
38. Stoker AM, **Kuroki K**, Cook CR, **Bozynski C**, Jayabalan P, Smith M, Stannard JP, Cook JL. Validation of the Mizzou OCA Preservation Methodology. The 14<sup>th</sup> Annual Comparative Orthopaedics Day, Columbia, MO, April 25, 2014.
39. Tomkovitch J, Schroepfer E, Wolfe M, **Wiedmeyer, CE**, Bukoski A, DeClue AE, **Evans TJ**, Johnson PJ. Effect of lithium chloride on inflammatory processes in the adult horse: ex vitro PAMP-induced cytokine responses in whole blood culture. Phi Zeta Research Day, Columbia, MO.
40. Wolfe, M, Tomkovitch, J, Schroepfer, E, Bukoski, A, DeClue, A, **Evans, T**, Johnson, P **Wiedmeyer, CE**. Validation of an automated, enzymatic, human assay for determination of serum and plasma lithium concentrations in horses. Phi Zeta Research Day, Columbia, MO.

41. Wulijji, J, Azapajouh, S, **Fales, W.H.** 2014. Anaerobic bacterial isolates from footrot lesions of sheep and goats. 12th Biennial Congress of the Anaerobe Society of the Americas, Chicago, IL.

**Professional Prgrams**

1. **Shaw, DP.** Chair, Turkey and Broiler health Management School. University of Missouri and Hampton Inn, Columbia, MO. 3-4 May 2014.
2. **Shaw, DP.** Chair, Layer Heath Management School. University of Missouri and Hampton Inn, Columbia, MO. 5-6 May 2014.