University of Missouri Veterinary Medical Diagnostic Laboratory (VMDL) Annual Report – 2015

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Summary

The University of Missouri Veterinary Medical Diagnostic Laboratory (MUVMDDL) is a full service veterinary diagnostic laboratory and it is Missouri’s only laboratory accredited by the American Association of Veterinary Laboratory Diagnosticians (AAVLD). The VMDL is also a Level II Lab of the National Animal Health Laboratory Network (NAHLN) and Tier I Lab of the FDA Veterinary Laboratory Response Network (FDA Vet-LRN). In 2015, the VMDL processed approximately 42,929 accessions (about 14% increase from 2014) and performed 90,515 tests. The VMDL diagnostic service was utilized by veterinarians and owners from 43 US states and 104 MO counties. In 2015, the VMDL faculty taught (or co-taught) 37 courses and 16 clinical/diagnostic rounds, and devoted more than 4,500 student-contact hours to teaching. The VMDL faculty received 14 extramural grants for a total of $1,333,921 and $435,297 to VMDL faculty. The VMDL faculty published 22 peer-reviewed papers; presented 57 conference abstracts, posters, and presentations; and attended 15 international, national and state conferences and trainings.
Introduction

The Veterinary Medical Diagnostic Laboratory (VMDL) Annual Report - 2015 is a compilation of test data from Jan 1, 2015 to Dec 30, 2015. To monitor caseload, testing data from 2011 to 2014 are also included in this report.

The MU VMDL is a full service veterinary diagnostic laboratory and it is Missouri’s only laboratory accredited by the American Association of Veterinary Laboratory Diagnosticians (AAVLD). The faculty and staff of VMDL are committed to excellence in diagnostic service, teaching, and research. We strive to provide relevant, timely, and cost-effective diagnostic services to our clients and create a positive learning environment for our students.

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 Teaching Hospital.

VMDL Advisory Board Members

Linda Hickam, DVM, Missouri State Veterinarian
Tony Martin, DVM, Director of Animal Health Division, MFA, Inc.
Don Nikodim, Executive Vice President, Missouri Pork Association
Steve Patterson, DVM, Bethel, MO
Clark Fobian, DVM, Sedalia, MO, Immediate Past President AVMA
Steve Strubberg, DVM, Hermann, MO
Chuck Massengill, DVM, Missouri Cattlemen’s Association
Bruce Addison, President, Addison Biological Laboratory, Inc.
David Wilson, DVM, MS, ACVS, MU VHC Director
Phillip Johnson, BVSc, MS, MRCVS, ACVIM MU VHC Equine Service
John Middleton, DVM, PhD, ACVIM MU VHC Food Animal Service

VMDL Organizational Structure

VMDL Section Heads/Leaders
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 – Dr. Jeff Mitchell
Quality Assurance – Dr. Tom Reilly/Susan Martin
Sample Receiving – Ms. Geri Hegstad
Serology – D. Mike Zhang
Virology – Dr. Jeff Mitchell
Toxicology – Dr. Tim Evans

**VMDL Diagnostic 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 Service Activities**

<table>
<thead>
<tr>
<th>Year</th>
<th>Total Accession</th>
<th>Main Lab</th>
<th>Clin Path</th>
<th>MO &amp; Other States</th>
<th>VMTH</th>
<th>Research</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011</td>
<td>37,311</td>
<td>24,910</td>
<td>12,401</td>
<td>19,791 (53%)</td>
<td>15,917 (43%)</td>
<td>1,402 (3.8%)</td>
<td>201 (&lt;1%)</td>
</tr>
<tr>
<td>2012</td>
<td>37,715</td>
<td>24,923</td>
<td>12,792</td>
<td>19,911 (53%)</td>
<td>16,118 (43%)</td>
<td>1,451 (3.8%)</td>
<td>235 (1%)</td>
</tr>
<tr>
<td>2013</td>
<td>38,499</td>
<td>25,165</td>
<td>13,334</td>
<td>20,081 (52%)</td>
<td>16,460 (43%)</td>
<td>1,867 (4.8%)</td>
<td>91 (&lt;1%)</td>
</tr>
<tr>
<td>2014</td>
<td>37,666</td>
<td>24,431</td>
<td>13,235</td>
<td>19,733 (52%)</td>
<td>16,476 (44%)</td>
<td>1,378 (3.6%)</td>
<td>79 (&lt;1%)</td>
</tr>
</tbody>
</table>
Table 1. Five Year VMDL (Main Lab and Clinical Pathology) Accessions*

*A Main Lab accession may include multiple tests for multiple samples whereas each Clin. Path accession represents one test performed on one sample. Caseload increased 13.97% from 2014 to 2015.

Table 2. Five Year VMDL (Main Lab and Clin Path) Tests by Animal Species*

* 2015 data do not include non-technical procedures.

Table 3. Five Year VMDL (Main Lab and Clin Path) Tests by Section
Figure 1. Distribution of Diagnostic Tests by Animal Species

Figure 2. Geographic Distribution of VMDL Accessions in 43 US States
Figure 3. Geographic Distribution of Cases in 104 MO Counties
VMDL Client Outreach Programs

The VMDL offers an online portal for its clients to check their results in real-time as we work on their samples.

VMDL continues to offer the FedEx Express Prepaid Stamps to all its clients which enables inexpensive second day delivery from clients’ office to the VMDL for laboratory testing. In 2015, the program was utilized 5,089 times by VMDL’s clients from 78 MO counties and 25 other states in the US.

Figure 3. Utilization of the FedEx Express Prepaid Stamps by Clients
VMDL Participation in National Diagnostic Network
Figure 3. Level II Lab of National Animal Health Laboratory Network (NAHLN)

Figure 4. Tier I Member of FDA Veterinary Laboratory Response Network (Vet-LRN)

VMDL Faculty Teaching Activities
### Didactic and Laboratory Courses (N = 37; Bold: Coordinated by VMDL Faculty)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>AS 140/2140</td>
<td>Companion Animals</td>
</tr>
<tr>
<td>AS 325/4977</td>
<td>Horse Production</td>
</tr>
<tr>
<td><strong>BioMed 3200</strong></td>
<td>Comparative Hematology</td>
</tr>
<tr>
<td>BioMED 3310</td>
<td>Biomedical Pathophysiology Online</td>
</tr>
<tr>
<td><strong>BioMed 4100</strong></td>
<td>Veterinary Clinical Chemistry, On-line</td>
</tr>
<tr>
<td>BioMed 4110/V_PBIO 7110</td>
<td>Veterinary Cytology</td>
</tr>
<tr>
<td>BioMED 4120</td>
<td>Principles of Toxicology On-line</td>
</tr>
<tr>
<td>LAB_AN 9437</td>
<td>Lab Animal Pathology</td>
</tr>
<tr>
<td>MMI 8050</td>
<td>Mechanisms of Microbial Pathogenesis</td>
</tr>
<tr>
<td>MICROB 9001</td>
<td>Topics in Microbiology</td>
</tr>
<tr>
<td>P Health 8001</td>
<td>Human Health and the Environment</td>
</tr>
<tr>
<td>V_BSCI 5506</td>
<td>Veterinary Cellular Biology</td>
</tr>
<tr>
<td>V_BSCI 5507</td>
<td>Veterinary Pharmacology</td>
</tr>
<tr>
<td>V_BSCI 5508</td>
<td>Veterinary Pharmacology</td>
</tr>
<tr>
<td>V_BSCI 5509</td>
<td>Veterinary Toxicology</td>
</tr>
<tr>
<td>V_M_S 6400</td>
<td>Food Animal Medicine &amp; Surgery I</td>
</tr>
<tr>
<td>V_M_S 6420</td>
<td>Equine Medicine and Surgery I</td>
</tr>
<tr>
<td>V_M_S 6987</td>
<td>Problem-Based Learning Clinic Preparation</td>
</tr>
<tr>
<td>V_M_S 6996</td>
<td>Advanced Dermatology</td>
</tr>
<tr>
<td>V_M_S 8036</td>
<td>Advanced Physiology of Dog and Cat</td>
</tr>
<tr>
<td>V_M_S 8402</td>
<td>Seminar in Veterinary Clinical Sciences</td>
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<tr>
<td>V_M_S 8402 B</td>
<td>Seminar in Veterinary Clinical Sciences</td>
</tr>
<tr>
<td>V_M_S 8402 D</td>
<td>Clinicopathologic Case Conference (CPC)</td>
</tr>
<tr>
<td>V_M_S 8415</td>
<td>Advanced Veterinary Neurology</td>
</tr>
<tr>
<td>V_M_S 8485</td>
<td>Problems in Veterinary Clinical Science</td>
</tr>
<tr>
<td>V_PBIO 5552</td>
<td>Veterinary Bacteriology 1</td>
</tr>
<tr>
<td>V_PBIO 5553</td>
<td>Veterinary Bacteriology 2</td>
</tr>
<tr>
<td>V_PBIO 5554</td>
<td>Veterinary Virology</td>
</tr>
<tr>
<td>V_PBIO 5575</td>
<td>General Veterinary Pathology</td>
</tr>
<tr>
<td><strong>V_PBIO 5576</strong></td>
<td>Veterinary Systemic and Special Pathology I</td>
</tr>
<tr>
<td><strong>V_PBIO 5577</strong></td>
<td>Veterinary Systemic and Special Pathology II</td>
</tr>
<tr>
<td>V_PBIO 5578</td>
<td>Veterinary Clinical Pathology</td>
</tr>
<tr>
<td>V_PBIO 6647</td>
<td>Diagnostic Pathology and Special Species Medicine I</td>
</tr>
<tr>
<td>V_PBIO 6679</td>
<td>Diagnostic Pathology and Special Species Medicine II</td>
</tr>
</tbody>
</table>
V_PBIO 8434  Advanced Clinical Pathology
V_PBIO 8435  Advanced Microscopy in Veterinary Clinical Pathology
V_PBIO 9090  Area Veterinary Pathobiology Dissertation Research

Clinical and Diagnostic Rounds and Seminars (n=16)

Chemistry Rounds
Comparative Orthopaedic Laboratory (COL) journal club
Cytology Rounds
Dermatology Rounds
Food for Thought Rounds
Gross Pathology Rounds
Hematology Rounds
Human Health and the Environment - Image Review
Joint Pathology Center Wednesday Slide Conference
Mentoring International Students
Mentoring Pre-Vet Students
Neurology Rounds
Ophthalmic Pathology Rounds
Slide treats
VMDL-Food Animal Monthly Rounds

Distribution of Student Contact Hours (4,509)
Residency Training Programs

Anatomical Pathology Resident Training
Clinical Pathology Resident Training

VMDL Faculty Scholarly Activities

Extramural Funding Received in 2015 (Total = $1,333,921; Total to VMDL Faculty = $435,297)


6. Kuroki, K. Co-I. Artelon. Evaluation of Artelon augmentation of tendon healing in a canine patellar tendon defect model. 06/01/15-05/31/16. Direct: $34,342; indirect: $17,928; total: $50,738; and shared credit: 10%.


9. Rottinghaus GE. Co-PI. Ergovaline concentrations in tall fescue samples from test plots in Kentucky and Georgia. AgResearch USA Limited, 2015. Total: $21,000.


Publications (N = 22)


**Book Chapters (N = 1)**


**Abstracts, Posters, and Presentations (N = 57)**


2. Casteel, Stan W., “Back Then, Now, What’s Next for Veterinary Medicine?”, Oklahoma State University, Center for Veterinary Health Sciences, Class of 1963 Distinguished Lecturer, November 19, 2015.


5. Casteel, Stan W., “Community Response to Biological Incidents,” Lake Erie College of Osteopathic Medicine, 1 LECOM Place, Erie, PA., Jan 29, 2015.


19. Coates JR, Williamson BC, Reinero CN; Rindt H; Pithua PO, Johnson GC; Sibigroth CM; Weichert A. Immunotherapeutic targeting a monomer/misfolded SOD1 in a canine model of ALS. P281. Robertson 26th international symposium on ALS/MND, 11-13 Dec, Orlando FL
22. Evans, Tim J. One health: one medicine. Short presentations as part of 2015 MU Global Scholars Program at various universities in Sao Paulo, Belém, and Rio de Janeiro, Brazil, June 8-June 18, 2015.
25. Evans, Tim J. 832-Pregnancy or lactation and medications and toxicants. 2015 AVMA Annual Convention, Boston, MA, July 12, 2015.
29. Evans, Tim J. What you thought you would never need to know about mycotoxins. 2015 GVMA Annual Convention, Atlanta, GA, November 10, 2015.
30. Evans, Tim J. Baby onboard: when pregnancy and/or lactation impact the possible adverse effects of medications and toxicants. 2015 GVMA Annual Convention, Atlanta, GA, November 10, 2015.
38. Ledoux, DR., Dos Anjos FR, Rotinghaus GE, and Chimonyo M. Efficacy of adsorbents (bentonite and diatomaceous earth) and turmeric (Curcuma longa) to ameliorate the toxic effects
40. Martin, S. Reilly, T. Evans, T. and Zhang, T. Rubric for Evaluating Root Cause Analysis in CAPAs, 58th AAVLD, Providence, RI, October, 2015.
41. Mhlanga-Mutangadura T., Johnson,G.S.;Johnson,G.C.;Hansen,L.; Tamassia,G.V.;Taylor,J.F.; Schnabel R.D., O'Brien DP. The whole genome sequences from a Rottweiler and black Russian terrier with overlapping neurological syndromes contain the same RAB3GAP1 frame shift mutation. 20th Annual American College of Veterinary Internal Medicine, Indianapolis IN, June 3-6, 2015.
50. Shaw D: Laying hen necropsy workshop. Missouri Organic Association Poultry Session,

52. Wells M, Rojas C, Royal A. Confirmation of Albumin and Total Protein Lower Levels of Linearity on a Beckman 400AU. 34th Annual Meeting of MAVP, Lexington, KY, August 6-7, 2015.


54. Yang, M. Zhang, C. Zhang, M. and Zhang, M. Comparative Biological Functions of Avian Beta-Defensins 6 and 12. MU Phi Zeta Research Day 2015 (Second Place Award)

55. Zhang, M. Bovine Viral Diarrhea Virus Infection: Associated Disease and Diagnosis. Department of Biomedical Sciences, College of Veterinary Medicine, University of Missouri. Columbia, MO 65211. Jan., 2015.


2015 Major Annual Professional Meetings and Trainings Attended by VMDL Faculty and Staff (N = 15)

AAVLD/NAHLN Auditors Training
AAVLD/NAHLN Quality Assurance Training
American Association of Veterinary Clinical Pathologists
American Association of Veterinary Laboratory Diagnosticians
American College of Veterinary Pathologists
American Society of Microbiology
American Society for Veterinary Clinical Pathology
American Veterinary Medical Association
Global Veterinary Summit
National Institute of Animal Agriculture
Missouri Veterinary Medical Association
Missouri Department of Agriculture State and Federal Conference
Monthly MVMA West Central meetings
World Association of Veterinary Laboratory Diagnosticians Conference