University of Missouri Veterinary Medical Diagnostic Laboratory (VMDL) Annual Report – 2019

Table of Contents

Summary .................................................. Page 1
Introduction ........................................... Page 2
VMDL Mission Statement ................................. Page 2
VMDL Advisory Board ................................ Page 2
VMDL Organizational Structure ....................... Page 3
Diagnostic Service Activities ......................... Page 4 – 9
National Programs .................................... Page 9 – 10
Faculty Teaching Activities .......................... Page 10 – 12
Faculty National and State Leadership Activities Page 12
Faculty/Staff Scholarly Activities .................. Page 12 – 19
Extension, Outreach and Engagement Activities Page 19 – 21
Faculty Awards ........................................ Page 21 – 22
Major Professional Meetings and Trainings .......... Page 22

Summary
The University of Missouri Veterinary Medical Diagnostic Laboratory (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 VMDL is a Level I Lab of the National Animal Health Laboratory Network (NAHLN), Tier I Lab of the FDA Veterinary Laboratory Response Network (FDA Vet-LRN), and a National Poultry Improvement Plan (NPIP) authorized Lab. In 2019, the VMDL processed approximately 51,668 accessions and performed more than 167,000 diagnostic tests, which represents a 6.5% increase in accessions and an 18.5% increase in lab tests from 2018 to 2019. The VMDL provided diagnostic service to veterinarians and owners from 107 MO counties/independent cities and 44 US states and Canadian provinces. In 2019, the VMDL faculty taught (or co-taught) 39 courses and 18 clinical/diagnostic rounds. The VMDL faculty led and participated in 20 extramurally funded projects, including 10 new projects. The VMDL faculty published 32 peer-reviewed research and clinical papers, submitted an additional 12 articles for publication, contributed chapters to important textbooks, presented 12 conference posters and oral presentations, served on many prestigious national, state and university committees, attended important international, national and state conferences and trainings, and participated in various outreach and engagement activities.
Introduction

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. The VMDL provides relevant, timely, and cost-effective diagnostic services to its clients and maintains a positive learning environment for the students.

The 2019 VMDL Annual Report summarizes diagnostic testing data, grants, publications, abstracts, and leadership activities from Jan 1, 2019 to Dec 30, 2019. To monitor caseload, data from 2015 to 2018 are also included in the report.

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 and service missions of the College of Veterinary Medicine.

To create new knowledge through fundamental and translational research.

The 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 Health Center.

VMDL Advisory Board Members

Steve Strubberg, DVM, Missouri State Veterinarian
Terry Gosch, DVM, USDA Area Veterinarian in Charge
Sherri Russell, DVM, Missouri Wildlife Veterinarian
Bruce Addison, President, Addison Biological Laboratory, Inc.
Philip Johnson, BVSc, MS, MRCVS, ACVIM, MU VHC Equine Service
Tony Martin, DVM, Director of Animal Health Division, MFA, Inc.
Chuck Massengill, DVM, Missouri Cattlemen’s Association
VMDL Organizational Structure

VMDL Section Heads/Managers
Anatomical Pathology – Dr. Gayle Johnson
Avian Diagnostics – Dr. Dan Shaw/Dr. Mike Zinn
Business Office – Mr. Kirk Thompson
Client Care and Outreach – Dr. Lauren Delaney
Clinical Pathology – Dr. Angela Royal/ Ms. Cheryl Rojas
Director’s Office – Ms. Geri Hegstad
Histology – Dr. Dae-Young Kim/Ms. Candace Kassel
Microbiology – Dr. Tamara Gull/Mr. Jesse Bowman
Molecular Diagnostics – Dr. Solomon (Wole) Odemuyiwa/Ms. Debra Sharp
Quality Assurance – Ms. Susan Martin
Sample Receiving – Ms. Geri Hegstad
Serology/Immunology – Dr. Mike Zhang
Toxicology/Analytical Chemistry – Dr. Tim Evans/Dr. Xiangwei Du/Mr. Ben Landers

**VMDL Diagnostic Program Coordinators**
Anatomical Pathology Residency Program – Dr. Kei Kuroki
Clinical Pathology Residency Program – Dr. Angela Royal
Clinical and Diagnostic Microbiology – Dr. Tamara Gull
Equine Diagnostic Investigations – Dr. Fred Williams III
Food Animal Diagnostic Investigations – Dr. Tim Evans
Neuropathology and Oncopathology – Dr. Gayle Johnson
Small Animal Internal Medicine Pathology – Dr. Dae-Young Kim

**VMDL Client Outreach Programs**
Outreach Section has been established to address clients’ needs and concerns.
Online Portal is available for clients to check results and charges in real-time.
FedEx Express Prepaid Stamps enables inexpensive next day delivery.
Columbia Area Sample Courier service is available.
After-hours Sample Drop-off refrigerator is available at the VHC Small Animal Emergency Clinic.

Food Animal Field Investigations
VMDL Exhibitor presence at various veterinary and livestock meetings including booth at Missouri State Fair
VMDL Attendance at Regional VMA Meetings

**Diagnostic Service Activities**

**Table 1. Five Year VMDL (Main Lab and Clinical Pathology) Accessions***

<table>
<thead>
<tr>
<th>Year</th>
<th>Total Accessions</th>
<th>Main Lab</th>
<th>Clin Path</th>
<th>MO &amp; Others/Total</th>
<th>VHC/Total</th>
<th>VHC/Main Lab</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015</td>
<td>48,848</td>
<td>32,195</td>
<td>16,653</td>
<td>28,266 (58%)</td>
<td>20,582 (42%)</td>
<td>3,929 (12%)</td>
</tr>
<tr>
<td>2016</td>
<td>48,617</td>
<td>30,032</td>
<td>18,585</td>
<td>26,293 (54%)</td>
<td>22,324 (46%)</td>
<td>3,879 (13%)</td>
</tr>
<tr>
<td>2017</td>
<td>45,680</td>
<td>25,598</td>
<td>20,082</td>
<td>22,631 (50%)</td>
<td>23,049 (50%)</td>
<td>3,873 (15%)</td>
</tr>
<tr>
<td>2018</td>
<td>48,538</td>
<td>27,719</td>
<td>20,819</td>
<td>24,339 (50%)</td>
<td>24,202 (50%)</td>
<td>4,156 (15%)</td>
</tr>
<tr>
<td>2019</td>
<td>51,668</td>
<td>26,933</td>
<td>24,675</td>
<td>23,417 (45%)</td>
<td>28,251 (55%)</td>
<td>4,309 (16%)</td>
</tr>
</tbody>
</table>
*A Main Lab accession may include multiple tests for multiple samples whereas each Clinical Pathology accession represents one test performed on one sample. More than 97% of clinical pathology accessions came from the VHC. Up to 16% of main lab accessions came from the VHC. From 2018 to 2019, total accessions increased 6.5%.

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

<table>
<thead>
<tr>
<th>Species</th>
<th>Avian</th>
<th>Bovine</th>
<th>Canine</th>
<th>Caprine</th>
<th>Equine</th>
<th>Feline</th>
<th>Wild/Exotic</th>
<th>Non-Animal</th>
<th>Ovine</th>
<th>Porcine</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015</td>
<td>8,306</td>
<td>18,579</td>
<td>42,595</td>
<td>1,609</td>
<td>11,217</td>
<td>7,067</td>
<td>7,005</td>
<td>4,196</td>
<td>579</td>
<td>5,280</td>
<td>106,433</td>
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<tr>
<td>2016</td>
<td>8,954</td>
<td>19,345</td>
<td>42,979</td>
<td>1,633</td>
<td>9,483</td>
<td>6,891</td>
<td>6,277</td>
<td>4,784</td>
<td>643</td>
<td>6,022</td>
<td>107,011</td>
</tr>
<tr>
<td>2017</td>
<td>10,298</td>
<td>17,693</td>
<td>44,570</td>
<td>2,270</td>
<td>9,156</td>
<td>7,517</td>
<td>15,657</td>
<td>4,590</td>
<td>568</td>
<td>3,557</td>
<td>115,876</td>
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<tr>
<td>2018</td>
<td>8,773</td>
<td>19,128</td>
<td>46,191</td>
<td>1,331</td>
<td>10,263</td>
<td>7,558</td>
<td>30,050</td>
<td>2,728</td>
<td>537</td>
<td>2,607</td>
<td>129,166</td>
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<tr>
<td>2019</td>
<td>4,118</td>
<td>15,878</td>
<td>64,204</td>
<td>1,778</td>
<td>10,140</td>
<td>9,975</td>
<td>44,882</td>
<td>1,790</td>
<td>1,414</td>
<td>3,715</td>
<td>157,894</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Year</th>
<th>Avian Dx.</th>
<th>Ana Path</th>
<th>Histo/ IHC</th>
<th>Clin Path</th>
<th>Micro</th>
<th>Molecular Dx.</th>
<th>Serology /Immun</th>
<th>Tox/Ana Chem</th>
<th>Research</th>
<th>Total</th>
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</thead>
<tbody>
<tr>
<td>2016</td>
<td>5,375</td>
<td>11,289</td>
<td>19,773</td>
<td>26,011</td>
<td>17,160</td>
<td>9,982</td>
<td>13,066</td>
<td>4,355</td>
<td>N/A</td>
<td>107,011</td>
</tr>
<tr>
<td>2017</td>
<td>5,415</td>
<td>11,352</td>
<td>29,850</td>
<td>28,249</td>
<td>16,727</td>
<td>10,911</td>
<td>21,634</td>
<td>4,610</td>
<td>N/A</td>
<td>128,748</td>
</tr>
<tr>
<td>2018</td>
<td>4,411</td>
<td>12,065</td>
<td>28,966</td>
<td>29,126</td>
<td>15,246</td>
<td>9,872</td>
<td>38,515</td>
<td>2,838</td>
<td>N/A</td>
<td>141,039</td>
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<tr>
<td>2019</td>
<td>1,587</td>
<td>12,154</td>
<td>41,117</td>
<td>31,992</td>
<td>13,589</td>
<td>8,449</td>
<td>46,646</td>
<td>2,360</td>
<td>9,193</td>
<td>167,087</td>
</tr>
</tbody>
</table>

*The number of diagnostic tests increased 18.5% from 2018 to 2019. 2017 and 2018 Histo/IHC numbers have been updated.

Table 4. Distribution of VMDL Accessions in 107 MO Counties/Independent City

<table>
<thead>
<tr>
<th>County</th>
<th>#ACCN*</th>
<th>County</th>
<th>#ACCN</th>
<th>County</th>
<th>#ACCN</th>
<th>County</th>
<th>#ACCN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boone</td>
<td>33,165</td>
<td>Saint Francois</td>
<td>180</td>
<td>Linn</td>
<td>77</td>
<td>Saint Clair</td>
<td>22</td>
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<tr>
<td>Saint Louis</td>
<td>1,342</td>
<td>Moniteau</td>
<td>167</td>
<td>Oregon</td>
<td>71</td>
<td>Knox</td>
<td>21</td>
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<tr>
<td>Not Specified</td>
<td>878</td>
<td>Lafayette</td>
<td>161</td>
<td>Osage</td>
<td>64</td>
<td>Stoddard</td>
<td>20</td>
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<tr>
<td>Charles</td>
<td>794</td>
<td>Howard</td>
<td>153</td>
<td>Laclede</td>
<td>62</td>
<td>Scotland</td>
<td>19</td>
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<tr>
<td>Greene</td>
<td>626</td>
<td>Monroe</td>
<td>153</td>
<td>Bates</td>
<td>60</td>
<td>Benton</td>
<td>18</td>
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<tr>
<td>Jackson</td>
<td>604</td>
<td>Randolph</td>
<td>150</td>
<td>Dunklin</td>
<td>59</td>
<td>Barton</td>
<td>17</td>
</tr>
<tr>
<td>Franklin</td>
<td>574</td>
<td>Pettis</td>
<td>137</td>
<td>Wright</td>
<td>59</td>
<td>DeKalb</td>
<td>17</td>
</tr>
<tr>
<td>Callaway</td>
<td>514</td>
<td>Marion</td>
<td>131</td>
<td>Warren</td>
<td>58</td>
<td>Maries</td>
<td>17</td>
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<tr>
<td>Cole</td>
<td>483</td>
<td>Putnam</td>
<td>124</td>
<td>Adair</td>
<td>55</td>
<td>Atchison</td>
<td>12</td>
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<tr>
<td>Camden</td>
<td>402</td>
<td>Cooper</td>
<td>121</td>
<td>Cedar</td>
<td>55</td>
<td>Clark</td>
<td>12</td>
</tr>
<tr>
<td>Johnson</td>
<td>399</td>
<td>Polk</td>
<td>116</td>
<td>Genevieve</td>
<td>54</td>
<td>Mississippi</td>
<td>12</td>
</tr>
<tr>
<td>Jefferson</td>
<td>355</td>
<td>Livingston</td>
<td>115</td>
<td>Henry</td>
<td>53</td>
<td>Ozark</td>
<td>10</td>
</tr>
<tr>
<td>Christian Cape</td>
<td>348</td>
<td>Stone</td>
<td>107</td>
<td>Morgan</td>
<td>45</td>
<td>Chariton</td>
<td>9</td>
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<tr>
<td>Girardeau</td>
<td>288</td>
<td>Saline</td>
<td>106</td>
<td>Platte</td>
<td>45</td>
<td>Sullivan</td>
<td>9</td>
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<tr>
<td>Phelps</td>
<td>266</td>
<td>Audrain</td>
<td>103</td>
<td>Crawford</td>
<td>41</td>
<td>Shannon</td>
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<tr>
<td>Saint Louis City</td>
<td>264</td>
<td>Miller</td>
<td>102</td>
<td>Pulaski</td>
<td>37</td>
<td>Gentry</td>
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<td>Jasper</td>
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<td>Texas</td>
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<td>Carroll</td>
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<td>Schuyler</td>
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<tr>
<td>Lincoln</td>
<td>227</td>
<td>Shelby</td>
<td>96</td>
<td>Dallas</td>
<td>31</td>
<td>Washington</td>
<td>5</td>
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</tbody>
</table>
**Table 5. Distribution of VMDL Accessions in 44 Non-MO States**

<table>
<thead>
<tr>
<th>State/Country</th>
<th># Accession</th>
<th>State/Country</th>
<th># Accession</th>
</tr>
</thead>
<tbody>
<tr>
<td>Illinois</td>
<td>877</td>
<td>Wisconsin</td>
<td>14</td>
</tr>
<tr>
<td>Arkansas</td>
<td>662</td>
<td>Michigan</td>
<td>10</td>
</tr>
<tr>
<td>Florida</td>
<td>452</td>
<td>Kentucky</td>
<td>9</td>
</tr>
<tr>
<td>Kansas</td>
<td>363</td>
<td>New Mexico</td>
<td>7</td>
</tr>
<tr>
<td>Oklahoma</td>
<td>334</td>
<td>South Dakota</td>
<td>6</td>
</tr>
<tr>
<td>North Carolina</td>
<td>247</td>
<td>Washington</td>
<td>5</td>
</tr>
<tr>
<td>California</td>
<td>98</td>
<td>Wyoming</td>
<td>5</td>
</tr>
<tr>
<td>Iowa</td>
<td>66</td>
<td>Alabama</td>
<td>4</td>
</tr>
<tr>
<td>New Jersey</td>
<td>53</td>
<td>Ohio</td>
<td>4</td>
</tr>
<tr>
<td>Puerto Rico</td>
<td>32</td>
<td>Maryland</td>
<td>3</td>
</tr>
<tr>
<td>Arizona</td>
<td>30</td>
<td>Tennessee</td>
<td>3</td>
</tr>
<tr>
<td>Massachusetts</td>
<td>30</td>
<td>British Columbia</td>
<td>2</td>
</tr>
<tr>
<td>Montana</td>
<td>30</td>
<td>Maine</td>
<td>2</td>
</tr>
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<td>Virginia</td>
<td>28</td>
<td>Ontario</td>
<td>2</td>
</tr>
<tr>
<td>Manitoba</td>
<td>27</td>
<td>Oregon</td>
<td>2</td>
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<td>Indiana</td>
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<td>Rhode Island</td>
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<td>Minnesota</td>
<td>26</td>
<td>Vermont</td>
<td>2</td>
</tr>
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<td>Utah</td>
<td>26</td>
<td>Connecticut</td>
<td>1</td>
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<td>Pennsylvania</td>
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<td>Delaware</td>
<td>1</td>
</tr>
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<td>Nebraska</td>
<td>19</td>
<td>Idaho</td>
<td>1</td>
</tr>
<tr>
<td>South Carolina</td>
<td>17</td>
<td>New York</td>
<td>1</td>
</tr>
<tr>
<td>Texas</td>
<td>16</td>
<td>Saskatchewan</td>
<td>1</td>
</tr>
</tbody>
</table>

*ACCN: Accession

**External Proficiency Tests**

**Clinical IT-VetView**

ASF Electronic Messaging Competency
CSF Electronic Messaging Competency
FMD Electronic Messaging Competency
IAV-A Electronic Messaging Competency
IAV-S Electronic Messaging Competency
Pseudorabies Electronic Messaging Competency

Clinical Pathology
Chemistry-Routine
Hematology
Microscopy
Urinalysis

Histology
Chronic Wasting Disease IHC

Microbiology
AAVLD Inter-laboratory Bacteriology Quality Assurance Survey
Contagious Equine Metritis (CEM) Culture
Listeria and Salmonella in Raw Dog Food
Salmonella Group D Culture and Serology - National Poultry Improvement Plan (NPIP)

Molecular Diagnostics
Avian Influenza Virus (IAV-A) qRT-PCR
Avian Paramyxovirus (APMV)-1/Exotic New Castle Virus qRT-PCR
African Swine Fever (ASF) qPCR
Classical Swine Fever Virus (CSFV) qRT-PCR
Foot-and-Mouth Disease Virus (FMDV) qRT-PCR
Swine Influenza Virus (SIV) qRT-PCR

Serology
Bluetongue Serology
Bovine Leukemia Virus (BLV) Serology
Brucellosis Serology
Chronic Wasting Disease (CWD) ELISA
Equine Infectious Anemia (EIA)
Johne’s ELISA
Pseudorabies Virus (PRV) gB & gl ELISA

Toxicology
Aflatoxin in Feedstuffs HPLC
Aflatoxin M1 in Tissues HPLC
Deoxynivalenol (DON) in Feedstuffs HPLC
Fumonisin in Feedstuffs HPLC

**VMDL Participation in National Diagnostic Programs**

**Figure 3. Level I Lab of National Animal Health Laboratory Network (NAHLN)**

**Figure 4. Tier I Member of FDA Veterinary Laboratory Investigation and Response Network (Vet-LIRN)**
### Faculty Teaching Activities

**Didactic and Laboratory Courses (N = 39; Bold: Coordinated by VMDL Faculty)**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
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<tbody>
<tr>
<td>AS 140/2140</td>
<td>Companion Animals</td>
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<td>AS 325/4977</td>
<td>Horse Production</td>
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<td>BioMed 3200</td>
<td>Comparative Hematology</td>
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<tr>
<td>BioMED 3310</td>
<td>Biomedical Pathophysiology Online</td>
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<td>Veterinary Clinical Chemistry, Online</td>
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<td>BioMed 4110/V_PBIO 7110</td>
<td>Veterinary Cytology</td>
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<td>BioMED 4120</td>
<td>Principles of Toxicology Online (Undergraduate Level)</td>
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<td>LAB_AN 9437</td>
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<td>Human Health and the Environment</td>
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<td>V_BSCI 5506</td>
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<td>V_M_S 8402 D</td>
<td>Clinicopathologic Case Conference (CPC)</td>
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<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>V_PBIO 5576</td>
<td>Veterinary Systemic and Special Pathology I</td>
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</tbody>
</table>
V_PBIO 5577  Veterinary Systemic and Special Pathology II
V_PBIO 5578  Veterinary Clinical Pathology
V_PBIO 5601/8601  Animals in Emergencies and Basic Emergency Response
V_PBIO 6647  Diagnostic Pathology and Special Species Medicine I
V_PBIO 6679  Diagnostic Pathology and Special Species Medicine II
V_PBIO 7120  Principles of Toxicology Online (Graduate Level)
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 = 18)

Chemistry Rounds
Comparative Orthopaedic Laboratory (COL) journal club
Cytology Rounds
Dermatology Rounds
Equine Journal Club
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 (Including Pre-Vet Scholars)
Mentoring Veterinary Professional Students at VET Orientation for VM-1s
Neurology Rounds
Ophthalmic Pathology Rounds
Slide Treats
VMDL-Food Animal Monthly Rounds

Residency Training Programs
Anatomical Pathology
Clinical Pathology
Clinical and Diagnostic Microbiology

International Programs

1. Department of Food Science and Engineering (USP) at the University of Sao Paulo (USP), Pirassununga, São Paulo, Brazil – Collaborative training and research
2. Agencia de Regulación y Control de la Bioseguridad y Cuarentena para Galápagos or Agency for Biosafety and Quarantine Regulation and Control for the Galápagos (ABG) – Building diagnostic capacity and collaborative research

Faculty National and State Leadership Activities

National and State Leadership

1. Evans T. Co-Chair AAVLD Toxicology Committee
2. Evans T. Member ABVT Student Award Committee
3. Evans T. Member ABVT Education Committee
4. Evans T. Veterinary Education Assessment Examination Question Reviewer
5. Gull T. ACVIM Credentials Committee.
6. Gull T. ACVM Board of Governors, ACVM Examination Committee, ACVIM Examination Committee.
7. Gull T. Chair, Drug & Medications Committee for the North American Trail Riding Conference
8. Royal A. Member of ACVP Certifying Exam Assembly and Administration Group (Clinical Pathology).
11. Zhang S. AAVLD President Elect, Member of AAVLD Bacteriology/Mycology Subcommittee, Antimicrobial Susceptibility Subcommittee, Quality Assurance Committee, Government Relations Committee, Strategic Planning Committee, and Workforce Development Committee.
12. Zhang S. Missouri Biosecurity Working Group

Faculty/Staff Scholarly Activities

Grants and Contracts
New Grants and Contracts


5. 2019-2020. Kevin Wells (PI), Kim DY (Co-PI, 5% effort). Swine somatic cell genome editing center. NIH office of the director. $1,129,562.00


7. 2019-2020. Zhang MZ (PD, 95% shared credit), Kim DY (CO-PD, 5% shared credit). Surveillance of chronic wasting disease (CWD) in Missouri wild deer and elk. MDC. $650,100


Existing Active

11. 2018-2023. Lucy M (PI), Evans TJ (Co-I, 5% shared credit), Gull T (Co-I, 5% shared credit). Uterine microbiome: Functional significance in establishing the uterine program postpartum. NIH (1R01HD092254-01A1), $1.6 million (Direct: $720,000, Indirect: $880,000).


15. 2017-2019. Cook JL (PI), **Kuroki K** (Co-I, (20% shared credit, 0% FTE). Pivotal Anchor Study: Supplement. ARTHREX, INC. $72,626 (Direct $50,505)

16. 2018-2019. Cook JL (PI), **Kuroki K** (Co-I, 10% shared credit, 5% FTE). ARTHREX, INC. $110,517 (Direct $76,855)


**Peer Reviewed Publications**

**Published**


**In Press and Submitted:**


**Book Chapters**


Scientific Presentations


7. Karaffa K, Hancock TS. Mental health experiences and service use among veterinary professionals. Invited presentation at the annual Missouri Veterinary Medical Association meeting, Columbia, Missouri. 2019


Extension/Outreach/Engagement Presentations

8. 3/6/2019 Delaney L. MU Extension Biosecurity Workshop (Versailles, MO): “What can the Diagnostic Lab do for you?”
9. 3/8/2019 Delaney L. MU Extension Biosecurity Workshop (Springfield, MO):” What can the Diagnostic Lab do for you?”
10. 3/13/2019 Delaney L. MU Extension Biosecurity Workshop (Cape Girardeau, MO): “What can the Diagnostic Lab do for you?”
11. 3/15/2019 Delaney L. MU Extension Biosecurity Workshop (Kirksville, MO): “What can the Diagnostic Lab do for you?”
12. 3/18/2019 Delaney L. MU Extension Biosecurity Workshop (St. Joseph, MO): “What can the Diagnostic Lab do for you?”
13. 7/23/2019 Delaney L. 2019 Missouri Swine Health Symposium (Sedalia, MO): “The place to test your pigs!”
15. 12/7/2019 Evans TJ. Annual Meeting of Academy of Veterinary Consultants (Kansas City, MO): “A Dynamic, but Practical Approach to Ergot Alkaloids”
16. 12/7/2019 Evans TJ. Missouri Livestock Symposium (Kirksville, MO): “Perilous Pastures and Fatal Feedstuffs for Cattle”
17. 12/7/2019 Evans TJ. Missouri Livestock Symposium (Kirksville, MO): “Perilous Pastures and Fatal Feedstuffs for Goats”
18. 12/7/2019 Evans TJ. Missouri Livestock Symposium (Kirksville, MO): “Perilous Pastures and Fatal Feedstuffs for Sheep”
20. 11/15/2019 Evans TJ. School’s Out COMO at MU Family Action Center (Columbia, MO): “Balloon Animal Medicine,” “Listening to a Dog’s Heart,” and supervision of service learning opportunity for Veterinary Professional Students

22. 11/8/2019 Evans TJ. MU VHC KC Animal Emergency Center (Kansas City, MO): “The Neighbor Did It”


24. 10/23/2019 Evans T. MU Engagement and Health Fair (Jesse Hall at MU): “Balloon Animal Medicine” and “Introduction to MU’s CVM and VMDL”

25. 10/23/2019 Evans TJ. MU CVM SAVMA (Columbia, MO): “The Dope on Dope”

26. 10/2019 Evans TJ. MU CVM (Columbia, MO): NAVLE “Toxicology Review”

27. Fall Semester Evans TJ. St. Louis High School Group (Columbia, MO): “The Box of Tox Introduction to Veterinary Toxicology”

28. Fall Semester Evans TJ. Kansas City High School Group (Columbia, MO): “The Box of Tox Introduction to Veterinary Toxicology”

29. 9/30/2019 Evans TJ. School’s Out COMO at MU Family Action Center (Columbia, MO): “Balloon Animal Medicine”

30. 9/21/2019 Evans TJ. Visit of Home Schooling Families to MU CVM (MU CVM, Columbia, MO): “Listening to a Dog’s Heart” and VHC Tour

31. 9/14/2019 Evans TJ. West Central Veterinary Medical Association (Marshall, MO): “Toxic Potpourri”

32. 8/28/2019 Evans TJ. Greater St. Louis Veterinary Medical Association Meeting (Creve Coer, MO): “The Neighbor Did It”

33. 8/28/2019 Evans TJ. Greater St. Louis Veterinary Medical Association (Creve Coer, MO): “Prescription, Over-the-counter, and Recreational Drug Intoxications in Small Animals”

34. 8/24/2019 Evans TJ. MIZZOU-TO-YOU at Lucas Motor Speedway (Hickory, MO): “Balloon Animal Medicine” and “An Introduction to MU’s CVM”

35. 8/18/2019 Evans TJ. Missouri State Fair (Sedalia, MO): “Balloon Animal Medicine” and “An Introduction to MU’s CVM and VMDL”

36. 7/15/2019 -7/19/2019 Evans TJ. Christian Veterinary Missions Trip to Navajo Reservation (Hardrock, AZ): Various talks to veterinary professional students from Auburn University, Texas A&M, Tufts University, and University of Florida, veterinarians, and Navajo pet and livestock owners on topics pertaining to toxic plants and animal health.

37. 6/10/2019 Evans TJ. Advanced Veterinary Academy (MU CVM, Columbia, MO): “The Box of Tox Introduction to Veterinary Toxicology”

38. 6/7/2019 Evans TJ. 4-H Summer Camp in Montgomery County: “The Box of Tox Introduction to Veterinary Toxicology”

39. 6/6/2019 Evans TJ. Derby Ridge Elementary School (Columbia, MO) with Ms. Cross’ 2nd Grade Class: “How Do You Become a Superhero?”

40. 4/24/2019 Evans TJ. Laclede County Soil and Water Conservation District Meeting (Lebanon, MO): “Nitrates and Cattle”
41. 4/18/2019 Evans TJ. Derby Ridge Elementary School (Columbia, MO) Ms. Cross’ 2nd Grade Class: “THE ANTIDOTE Says Don’t Let Your Dog Eat Chocolate, PART II”
42. 4/13/2019 Evans TJ. Show Me MIZZOU Day (MU Campus, Columbia, MO): “Balloon Animal Medicine” and “An Introduction to MU’s CVM”
43. 4/6/2019 Evans TJ. MU CVM Open House (MU CVM, Columbia, MO): “Veterinary Toxicology for Young Pet Owners”
44. 4/4/2019 Evans TJ. Missouri Environmental Health Association Meeting (Springfield, MO): “Nitrate/Nitrite Poisoning from the Human and Animal Perspectives.”
45. 2/26/2019 Evans TJ. Southwest Missouri Spring Forage Conference (Springfield, MO): “How to Find Out What Killed the Cow, When It Wasn’t the Feed or the Vaccines”
46. 2/14/2019 Evans TJ. Derby Ridge Elementary School (Columbia, MO) Ms. Cross’ 2nd Grade Class: “THE ANTIDOTE Says Don’t Let Your Dog Eat Chocolate”
47. 2/9/2019 Evans TJ. Columbia’s Young Scientist Fair (Columbia, MO): “Balloon Animal Medicine” and “An Introduction to MU’s CVM”
49. 1/14/2019 Evans TJ. Derby Ridge Elementary School (Columbia, MO) Junior Achievement Day with Ms. Cross’ 2nd Grade Class: “What Do You Want to Do When You Grow Up?”
50. August 2019 Ierardi RA. Contribution to Academy of Veterinary Consultants (AVC) Diagnostic Laboratory Report. “Anaplasma marginale cELISA Testing Summary”
51. October 2019 Ierardi RA. Bovine Pneumonia Summary – MU VMDL Website.
52. December 2019 Ierardi RA. Contribution to Academy of Veterinary Consultants (AVC) Diagnostic Laboratory Report. “Bovine Respiratory Disease and Bovine Viral Diarrhea”
53. 10/16/19 Williams F 3rd. Pre-Vet Club “Why Do Necropsies and How to Get into Vet School”
54. 10/10/19 Williams F 3rd. NAVLE Review Part 1
55. 10/14/19 Williams F 3rd. NAVLE Review Part 2
56. 9/11/19 Williams F 3rd. Zew Club Pathology Talk
57. 7/17/19 Williams F 3rd. Dog Days of Summer
58. 6/10-12/19 Williams F 3rd. Advanced Veterinary Academy
59. 5/7/19 Williams F 3rd. Exotics Animal Behavior Talk
60. 4/6/19 Williams F 3rd. Open House. Why Do Necropsies
61. 2/21/19 Williams F 3rd. Zoo/Wildlife Pathogen Talk
62. 1/22/19 Williams F 3rd. Pathology Club Necropsy Lab
63. 1/13/19 Williams F 3rd. Exotics Symposium Wet Lab

Faculty Awards

Hancock TS. 2019 Outstanding Young Alumni Award from the College of Veterinary Medicine at Iowa State University.

Williams F 3rd and Evans T. 2019 Finalists for Hooding Veterinary Professional Students at
Commencement.

Major Annual Professional Meetings and Trainings

1. American Association of Veterinary Laboratory Diagnosticians (AAVLD) Annual Meeting
2. American College of Veterinary Internal Medicine (ACVIM) Annual Meeting
3. American College of Veterinary Microbiologists (ACVM) Annual Meeting
4. Combined Annual Meetings of the American College of Veterinary Pathologists (ACVP) and American Society for Veterinary Clinical Pathology (ASVCP)
5. American Veterinary Medical Association (AVMA) Annual Meeting
6. Midwest Association of Veterinary Pathologists Annual Meeting
7. Missouri Veterinary Medical Association (MVMA) Annual Meeting and District Meetings
8. Missouri Biosecurity Working Group Quarterly Meetings
9. Missouri Captive Wild Animal Health Meetings
10. US Animal Health and AAVLD Government Relations Meeting
11. Vet-LIRN (Veterinary Laboratory Investigation and Response Network) Monthly Conference Calls