



# CENTER OF EXCELLENCE

in

# Livestock Diseases & Human Health

2020 Annual Report



THIS REPORT IS PRODUCED BY

**THE UNIVERSITY OF TENNESSEE**  
**College of Veterinary Medicine**

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*Cover photo by Tory Salvador.*

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*Photo by Tory Salvador.*

# About the Institute

Through its colleges, research and education centers, and county extension offices, **the University of Tennessee Institute of Agriculture (UTIA)** serves the people of Tennessee and beyond through discovery, communication, and application of knowledge. UTIA, working with the University of Tennessee, Knoxville, is committed to providing undergraduate, graduate, and professional education programs in a diverse learning environment that prepares students to be leaders in a global society. The institute's delivery of education, discovery, and outreach contributes to the economic, social, and environmental well-being of all Tennesseans and focuses on contemporary problems faced by Tennessee, the nation, and the world.

**AgResearch** is an integral partner in teaching programs throughout the Institute. AgResearch faculty conduct world-class research programs in a variety of areas including crop breeding and genetics, soil conservation, no-till crop production, cattle reproduction, wood product development, and numerous other areas. AgResearch is also a key funding source for graduate assistantships and research endeavors graduate students participate in during their degree programs. The internship program of AgResearch offers undergraduate students unparalleled field experience. The unit's ten branch research facilities serve as field laboratories for faculty and students, allow the public to evaluate research trials, and allow the public to experience gardens and arboretums.

**The Herbert College of Agriculture** welcomes students from across Tennessee, the nation, and the world. It offers academic programs in a variety of natural and social science-based disciplines that apply to the food, fiber, and natural resources systems. For students in the College, learning is personal and often hands-on. Student teams provide opportunities for self-directed study, leadership development, and a lot of fun. A new honors research and creative achievements program challenges students to excel. International study tours give graduates an edge in the increasingly connected world of global markets.

**The College of Veterinary Medicine (CVM)** is one of only thirty veterinary colleges in the nation. The central mission of the College is educating Doctor of Veterinary Medicine (DVM) students seeking a career in one of the many aspects of the profession ranging from clinical practice to research. The College also serves the public in providing referral medical services to pet owners, zoos, and the livestock industry through the UTCVM Veterinary Medical Center. In addition, the college protects public health, enhances medical knowledge through research and education of graduate students, and generates economic benefits to the state and nation. Outreach programs engage an array of citizens and their animals in learning programs that explore the human-animal bond and promote wellbeing.

**UT Extension** has an office in each of the ninety-five counties in Tennessee. Educational programs offered by UT Extension touch the lives of each citizen in the state every day, and deliver research-based programs that improve lives, build stronger families, and strengthen communities. As a partner with local, state, and national agencies, and through its statewide presence, UT Extension provides educational programming and assistance in areas of agriculture, natural resources and resource development, family and consumer sciences, and 4-H youth development.

## ADMINISTRATION

**Dr. David E. Anderson**

*Associate Dean for Research and Graduate Studies*

**Dr. Stephen A. Kania**

*Assistant Dean for Research and Graduate Studies*

**Dr. James P. Thompson**

*Dean, College of Veterinary Medicine*

**Dr. Tim L. Cross**

*Senior Vice President/Senior Vice Chancellor,  
University of Tennessee Institute of Agriculture*

## OUR MISSION

1. To promote interdisciplinary activities designed to improve the quality of human life through better animal health.
2. To expand livestock disease research capabilities.
3. To identify and characterize animal diseases that are similar to human disease.
4. To develop new strategies for the diagnosis, treatment, and prevention of disease.

# Letter from the Dean

I am pleased to present the 2020 annual report for the Center of Excellence in Livestock Diseases and Human Health, based in the College of Veterinary Medicine, UT Institute of Agriculture at the University of Tennessee, Knoxville. This report provides a comprehensive overview of the utilization of funds to support the Center missions to promote interdisciplinary activities designed to improve the quality of human life through advances in animal health; to expand livestock disease research capabilities; to identify and characterize animal diseases that are similar to human disease; and to develop new strategies for the diagnosis, treatment, and prevention of disease.



Within this report, research and productivity of thirteen COE faculty are highlighted: eight faculty received COE seed grants and five faculty received start-up funding from COE during FY20. These faculty members have made significant advancements to grow research strengths including infectious disease and immunology, regenerative and rehabilitative medicine, and prevention and treatment of infectious and non-infectious livestock diseases that affect agricultural productivity.

Metrics used to assess annual return on investment show extramural funding remains strong despite a smaller number of extramural grant awards. In FY20, the ratio of research funding and research expenditures to state appropriation for the Center was 4.6:1 and 2.2:1, respectively. The lower ROI ratio for research expenditures is associated with transitions in research faculty, with extended searches to replace research intensive faculty who retired or left the College, and pandemic restrictions on research activities during the last quarter of the year.

Center faculty continue to garner national and international recognition for their research with significant scholarship increases in calendar year 2019. During CY19, Center faculty published fifty-nine peer-reviewed articles and four book chapters, and authored 105 abstracts, posters, and program presentations. In addition, COE faculty made three new invention disclosures and had one patent filed.

Despite increased fiscal challenges faced by our Center faculty, we are incredibly proud of their efforts and continued successes. The College has successfully recruited four new faculty with significant research assignments. We anticipate these faculty will have an immediate impact on research, awards, and productivity. We hope you enjoy this summary presentation of Center activities and accomplishments.

**Dr. James P. Thompson, Dean**

UT College of Veterinary Medicine

# Summary of Accomplishments

The Center of Excellence in Livestock Diseases and Human Health continues to serve its mission to promote interdisciplinary activities designed to improve the quality of human life through better animal health, to expand livestock disease research capabilities, to identify and characterize animal diseases that are similar to human disease, and to develop new strategies for the diagnosis, treatment, and prevention of disease. The Center of Excellence plays a vital role in advancing human and animal health by supporting faculty, students, research infrastructure, and the acquisition of state-of-the-art research equipment. Faculty and students play a vital role in discovering new knowledge regarding the interrelationships among humans, animals, and the environment. To this end, the One Health Initiative was established in 2019 under the direction of Dr. Debra Miller. Dr. Miller is Professor and Director of the Center for Wildlife Health in the University of Tennessee Institute of Agriculture and now serves as the founding director of the One Health Initiative. Dr. Miller is in an ideal position to lead the OHI as she has a split appointment between the College of Veterinary Medicine and the Department of Forestry, Wildlife and Fisheries. In this role, she will serve to foster multidisciplinary research with institutional, national, and international collaborations.

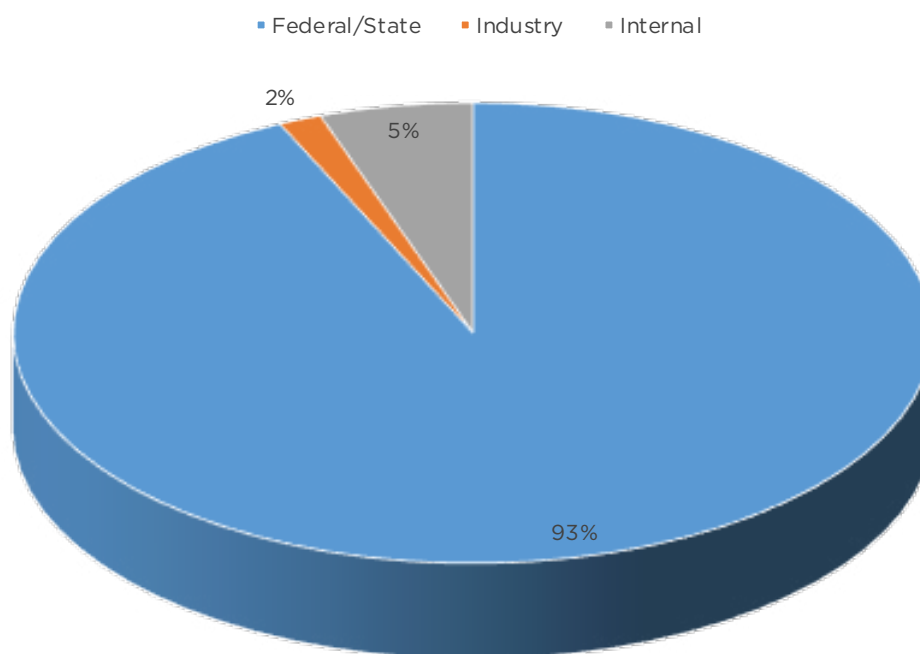
Multiple faculty who were supported by Center of Excellence (COE) funding were successful in seeking extramural funding to advance their research. In FY20, COE faculty were awarded \$3,632,232 in extramural funding. These funds were awarded, primarily, from federal granting agencies. Dr. David Anderson received funding as a sub-award with the University of Arkansas (\$2.9M) in joint grants submitted to the Department of Defense, Army JWMP, and PRORP programs. Dr. Anderson also received \$25,935 from the National Science Foundation as part of a collaborative grant with Dr. Dustin Crouch, biomedical engineer in the College of Engineering at the University of Tennessee, Knoxville. Dr. Barry Rouse received three grants through the National Institutes of Health (NIH) to continue his studies on viral pathogenesis with special emphasis on eye diseases. Dr. Rouse received a total of \$632,460 through NIH grant awards. Dr. Stephen Kania received a total of \$57,876 in industry funding from Boehringer Ingelheim Animal Health (BIAH). One grant from BIAH totaling \$42,000 was awarded to evaluate a vaccine for the treatment of methicillin-resistant *Staphylococcus pyoderma* in dogs. Another grant from the Boehringer Ingelheim Veterinary Scholars Program totaling \$15,876 was secured to support summer research experience programs for professional students in the College of Veterinary Medicine.

In 2019, Center of Excellence faculty remained actively engaged through publications and presentations to local, national, and international audiences. The thirteen Center faculty accounted for fifty-nine peer-reviewed research articles, four book chapters, and 105 presentations/posters/abstracts. Scholarly productivity metrics show that COE faculty published an average of 4.5 journal articles per faculty member and participated in an average of 8.1 scientific presentations, posters, and abstracts.

Overall, research expenditures by Center of Excellence faculty decreased in FY20. The College of Veterinary Medicine experienced the loss of some tenure-track faculty through retirements and job relocations, which likely had a negative impact on research expenditures. Research expenditures were substantially affected by the COVID-19 pandemic as a result of research laboratories being shut down or significantly limited during the period from March through June 2020. Throughout most of the second half of FY20, live animal and in-person research was severely restricted. Extramural funding during FY20 totaled \$3,632,232 resulting in a FY20 return on investment based on new research awards of 4.6:1.



## FY20 Sources of COE Faculty Research Funding



Benchmark	2020 (13 Faculty)	2019 (12 Faculty)
	N <sup>1</sup>	N <sup>2</sup>
<b>Publications</b>	<b>63</b>	<b>46</b>
<i>Peer-Reviewed Articles</i>	59	46
<i>Books/Chapters/Other</i>	4	0
<b>Presentations/Posters/Abstracts</b>	<b>105</b>	<b>42</b>
<i>International</i>	14	7
<i>National</i>	53	28
<i>State or Local</i>	38	7
<b>Invention Disclosures</b>	<b>3</b>	
<b>Patent Filings</b>	<b>1</b>	
<b>Research Funding</b>		
<i>External Grant Funding</i>	\$3,632,232	\$2,027,793
<i>Internal Funding</i>	\$207,077	
<i>Research Expenditures</i>	\$1,153,173.32	\$1,654,883
<b>Return on Investment</b>	<b>4.6:1</b>	<b>3.2:1</b>

<sup>1</sup> Publications and presentations based on the 2019 calendar year; research monies based on the FY20.

<sup>2</sup> Publications and presentations based on the 2019 calendar year; research monies based on FY20

# PROGRAM REPORT

# Introduction

The Center of Excellence (COE) in Livestock Diseases and Human Health was founded in 1984. The Center of Excellence serves a critical role in the Institute of Agriculture and the University of Tennessee, Knoxville to serve the missions of research, education, and service to the state of Tennessee and national/international communities. Faculty participating in the Center of Excellence programs meet these responsibilities by conducting original research for the purpose of discovering new knowledge and disseminating that knowledge to stakeholders. This includes training undergraduate, professional, and graduate students in the fine arts of evaluation and interpretation of research, so that these students can gain the knowledge and skills to become the next generation of scientists and scholars. Faculty also serve through collaborations with scientists throughout the nation and global community and dissemination of discoveries through publications, presentations, and outreach activities with stakeholders.

The COE faculty have research strengths in several areas that are enhanced through interdisciplinary and multidisciplinary collaboration in the pursuit of extramurally funded research.

Areas of research emphasis with COE faculty include:

- ***Infectious disease and immunology***
- ***Regenerative and rehabilitative medicine***
- ***Genomics***
- ***One Health***
- ***Translational models for animal and human disease***

All of these research areas intertwine for the purpose of advancing human and animal health and supporting agriculture. Resources available to the Center of Excellence are utilized to promote research through startup packages for new faculty. In addition, these resources are utilized to fund seed grants to support faculty extramural grant submissions and purchase equipment to expand research capabilities and improve competitiveness for extramural funding. Summer research student programs and the annual Research Day conference in which results of COE activities are presented to faculty, students, and the community are also supported by resources available to the Center of Excellence.

# Personnel



**Dr. David E. Anderson**  
*Director of the Center of Excellence*



**Dr. Stephen A. Kania**  
*Director of Center of Excellence student programs*



**Dr. Madhu Dhar**  
*Chair of Research Committee*



**Kim Rutherford**  
*Oversees submissions of faculty proposals for funds*



**Amanda Hand**  
*Annual report production*

# Funding and Expenditures

## Research Funded Externally, FY20

Lead Investigator	Federal/State	Industry	University	Foundation/ Private	Total
Dr. David Anderson	\$2,941,896.00	-	-	-	\$2,941,896.00
Dr. Stephen Kania	-	\$57,876.00	-	-	\$57,876.00
Dr. Barry Rouse	\$632,460.00	-	-	-	\$632,460.00
<b>TOTALS</b>	<b>\$3,574,356.00</b>	<b>\$57,876.00</b>			<b>\$3,632,232.00</b>

## Research Expenditures, FY20

Lead Investigator	Federal/State	Industry	University	Foundation/ Private	Total
Dr. David Anderson	\$491,477.18	\$70,343.39	\$9,236.62	-	\$571,057.19
Dr. Marc Caldwell	\$8,558.62	\$207.70	\$3,977.90	-	\$12,744.22
Dr. Vermont Punongba Dia	-	-	\$20,109.04	-	\$20,109.04
Dr. Stephen Kania	\$7,894.95	\$22,173.97	\$11,099.76	-	\$41,168.68
Dr. Andrea Lear	\$2,011.73	-	\$10,914.30	-	\$12,926.03
Dr. Chika Okafor	\$5,542.65	-	\$16,710.00	-	\$22,252.65
Dr. Barry Rouse	\$391,685.61	\$6,868.83	\$13,508.00	-	\$412,062.44
Dr. Liesel Schneider	\$30,601.62	-	\$12,346.15	-	\$42,947.77
Dr. Hwa-Chain Robert Wang	\$7,120.61	-	\$31,115.88	-	\$38,236.49
<b>TOTALS</b>	<b>\$944,892.97</b>	<b>\$99,593.89</b>	<b>\$129,017.65</b>	<b>-</b>	<b>\$1,173,504.51</b>

# Allocation of Funding

Allocation of funding within the Center of Excellence (COE) in Livestock Diseases and Human Health promotes research for faculty and students in order to advance knowledge in animal and human health. Funding supports a variety of activities including faculty startup packages associated with the recruitment of new faculty and seed grants for faculty to develop necessary data to support extramural grant submissions and foster new collaborative research initiatives. This funding also works to ensure students are engaged in research with faculty and have the necessary resources to achieve their goals. Purchasing new equipment to advance and expand research capabilities of COE faculty and updating laboratories to ensure facilities are modern and sufficient for the recruitment and continued success of COE faculty is also accounted for in the allocation of COE funding.

Center of Excellence faculty include tenure-track faculty at all stages of career development. Startup funds are assigned to newly hired tenure-track assistant professors to ensure they have sufficient resources to establish a research program and develop data and publications that will contribute to their competitiveness as principal investigators on extramural grant submissions. Other Center of Excellence funds used to promote faculty research are awarded annually through the Center's call for research proposals, which occurs each spring. The UTCVM research committee reviews each proposal and makes recommendations to the Associate Dean for Research regarding which proposals are best aligned with the objectives of the Center of Excellence and are most likely to contribute to the faculties' ability to successfully compete for extramural funding. A number of special requests occur during the year with respect to COE faculty needs and operations of their laboratories. The Associate Dean for Research addressed these requests on a case-by-case basis.

## Start-Up Funds

The Center provided \$41,333 in start-up funds for six junior faculty members to secure additional funding in 2019. The junior faculty members' research areas are described below:



**Dr. Jonathan Abbott**  
*Small Animal Clinical Sciences*  
\$5,000



**Dr. Alejandro Esteller-Vico**  
*Biomedical & Diagnostic Sciences*  
\$9,000



**Dr. Stephanie Kleine**  
*Small Animal Clinical Sciences*  
\$5,000



**Dr. Andrea Lear**  
*Large Animal Clinical Sciences*  
\$12,333



**Dr. Denae LoBato**  
*Biomedical & Diagnostic Sciences*  
\$5,833

# Infrastructure and Supplies

Center of Excellence funds support research infrastructure in the UT College of Veterinary Medicine and the UT Institute of Agriculture and include the purchase of equipment, maintenance of shared essential research equipment, and other needs for support in shared laboratories. Requests for funds are evaluated by the research advisory committee. This committee reviews funding requests and recommends supporting or denying requests based on justification. The committee ensures the request being evaluated does not represent a redundant request relative to existing resources. The committee also considers the number of faculty who are likely to benefit from the resources and equipment of the request.

## Equipment

During FY20, the Center of Excellence funded several research equipment requests. A Vicon motion capture system was purchased to use in kinetic analysis of motion. This system greatly advances the faculty research and enables the performance of clinical trials the college did not previously have the capabilities to execute. The Center contributed toward the purchase of a MALDI-TOF analytical unit for the bacteriology laboratory. This equipment is a matrix assisted laser desorption and ionization time-of-flight mass spectrometer and provides rapid, efficient, and species-specific identification of bacteria and fungi. The MALDI-TOF is the current industry standard, which also has the benefit of



*The Instron 5567 electromechanical testing machine has enabled faculty and graduate students to enhance their research. Data has been used in publications as well as preliminary data in support of multiple extramural grant submissions.*



*The high-speed cameras of the Vicon motion capture system track markers placed on the animal, allowing researchers to perform complex gait analysis.*

increasing biosafety and decreasing biohazard waste. This unit enables identifications of new or poorly characterized organisms which may not otherwise be recognized. The MALDI-TOF significantly enhances our discovery efforts for research in infectious disease. Also, the Center shared in the purchase of a Moleculight camera with the UTCVM Small Animal Clinical Sciences and Large Animal Clinical Sciences departments. This is a state-of-the-art wound imaging and bacterial fluorescent camera that recently has been introduced to human medicine. This camera will greatly accelerate animal models research and clinical trials research in the assessment of wound healing and bacterial contamination and growth.

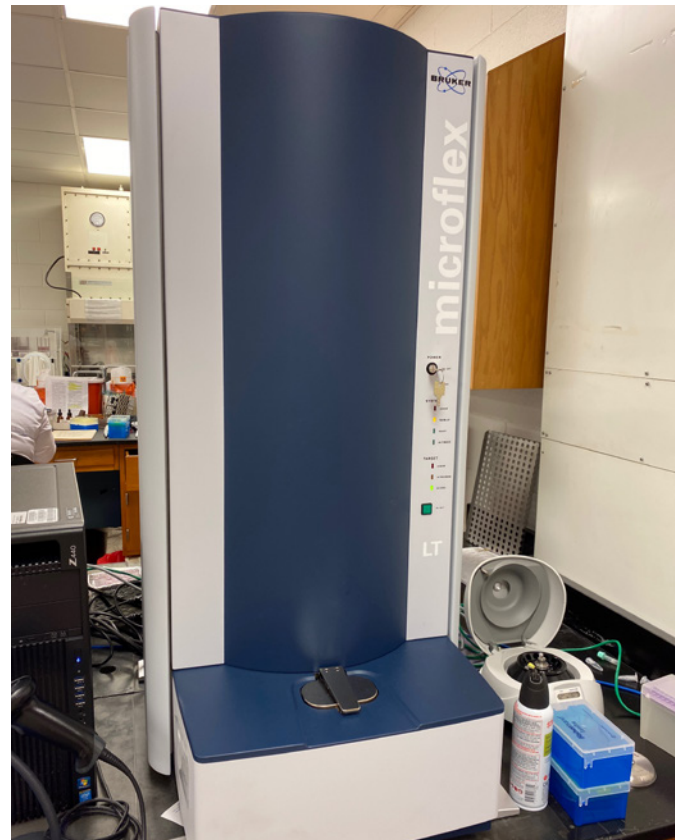
## Supplemental Funding

Spanning his entire time as a professor at the University of Tennessee, Distinguished Professor Dr. Barry Rouse has received continuous funding from the National Institutes of Health (NIH) since 1978. Dr. Rouse has often held more than one NIH Research Project Grant (RO1) award simultaneously and recently received yet another renewal to continue research exploring the fundamental mechanisms of immunopathology of herpes virus corneal disease. As a result, this NIH RO1 grant, first awarded in 1984, has been renewed repeatedly for well over thirty years, which is a major accomplishment.

## Travel

During FY20, the Center of Excellence provided \$7,172.46 to support travel expenses of faculty and students. These funds were used to partially offset the expenses incurred to participate in national and international meetings. Faculty traveling to national scientific meetings included:

- Dr. Cheryl Greenacre traveled to middle Tennessee sampling turkeys for toxoplasmosis testing
- Dr. Remi Grześkowiak presented his PhD work to the American College of Veterinary Surgeons
- Dr. Stephen Kania traveled with Comparative & Experimental Medicine (CEM) students to the National Veterinary Student Symposium, hosted by Tufts University
- Dr. Agricola Odoi traveled to Florida to work with the Florida Department of Health and meet with research collaborators
- Dr. Kyle Snowden presented research at the American College of Veterinary Surgeons
- Dr. Richard Gerhold traveled to Berlin, Germany to present the results of his research at the fifth international meeting on apicomplexan parasites in farm animals



*MALDI-TOF analytical unit provides rapid, efficient, and species specific identification of bacteria and fungi.*

# UTCVM Research Day

The Center was a major sponsor of the University of Tennessee College of Veterinary Medicine Research Day. This event is designed to serve as a venue for students and new investigators to gain experience in showcasing their research while also providing potential collaboration and networking opportunities. This year, eighteen graduate students and six veterinary students delivered oral presentations. An additional ten presentations were delivered by residents, post-docs, and faculty members. These presenters include Drs. Elizabeth Anglin, Engin Berber, Austin Bow, Natalie Chow, Michelle Dennis, Luca Giori, Silke Hecht, Rebecca Rifkin, Peter Sojka, and Deepak Sumbria. Student presentations were scored based on their performance. The winners of Research Day are highlighted below.

## 2020 UTCVM Research Day Awards - Presentation Award Winners

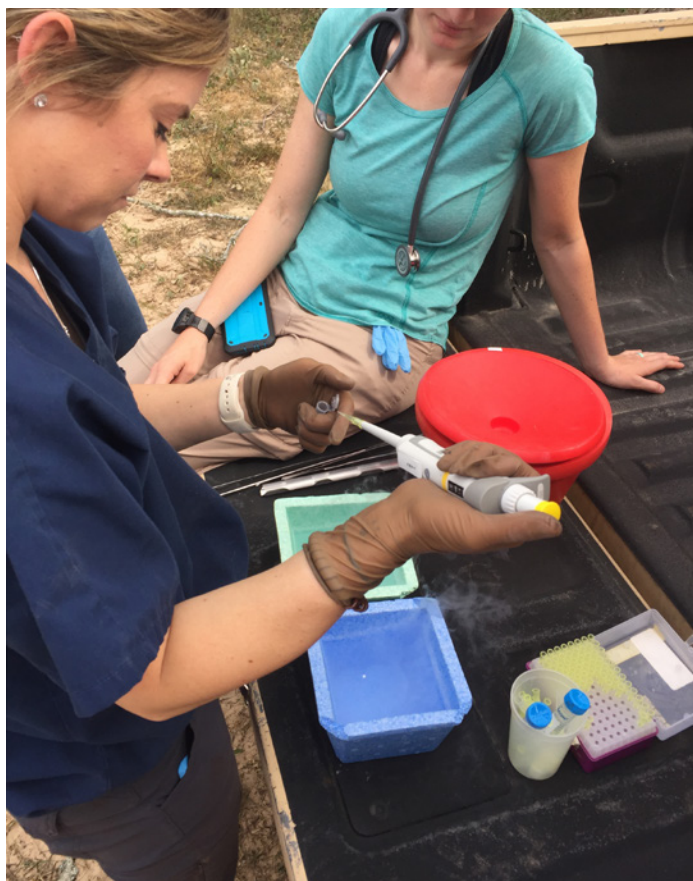
### Graduate Student Category

#### 1st Place – Dr. Ashley Reeves Wilmoth, Comparative & Experimental Medicine

**Presentation:** Assisted Reproductive Techniques in Free-Ranging Ocelot and Bobcat Populations in South Texas

**Mentor:** Dr. Debra Miller

**Travel award:** \$500.00



*(Left) Ultra-rapid freezing (URF) technique of semen pellets over liquid nitrogen. (Upper right) Assessment of motility of spermatozoa under phase contrast microscopy. (Lower Right) Ultrasonography of a female ocelot under the influence of anesthetic compounds for determination of pregnancy status.*



### **2nd Place – Dr. Anastasia Towe, Comparative & Experimental Medicine**

**Presentation:** *Batrachochytrium salamandrivorans* lesions in larval Northern two-lined salamanders (*Eurycea bislineata*)

**Mentors:** Drs. Debra Miller and Matthew Gray

**Travel award:** \$300.00

### **3rd Place – Dr. Jane Woodrow, Comparative & Experimental Medicine**

**Presentation:** Analysis of Bronchoalveolar Lavage Reveals Mast Cell Chymase Dysregulation and IFN-gamma as Possible Indicators of Equine Asthma Categories

**Mentors:** Drs. Barry Rouse and Elizabeth Lennon

**Travel award:** \$200.00

## **Veterinary Student Category**

### **1st Place – Blake Andrews, Class of 2022**

**Presentation:** Symmetric dimethylarginine (SDMA) in captive tigers (*Panthera tigris*)

**Mentors:** Drs. Andrew Cushing and Mee-Ja Sula

**Travel award:** \$500.00

### **2nd Place – Emily Kent, Class of 2023**

**Presentation:** Control of *Salmonella* Dublin in a Dairy Herd

**Mentors:** Drs. Andrea Lear and Chika Okafor

**Travel award:** \$300.00

### **3rd Place – Allison Andrews, Class of 2023**

**Presentation:** Epidemiology of Bovine Anaplasmosis in TN Cattle

**Mentors:** Drs. Brian Whitlock and Chika Okafor

**Travel award:** \$200.00

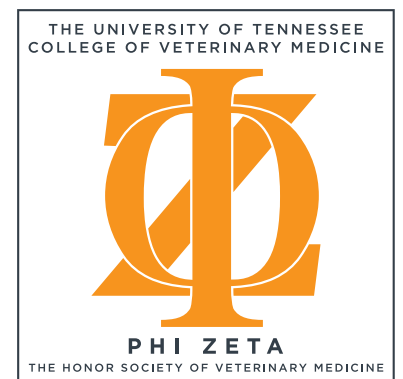
## **Phi Zeta Award for Excellence in Animal Health Research**

### **Kassandra Downing, Class of 2022**

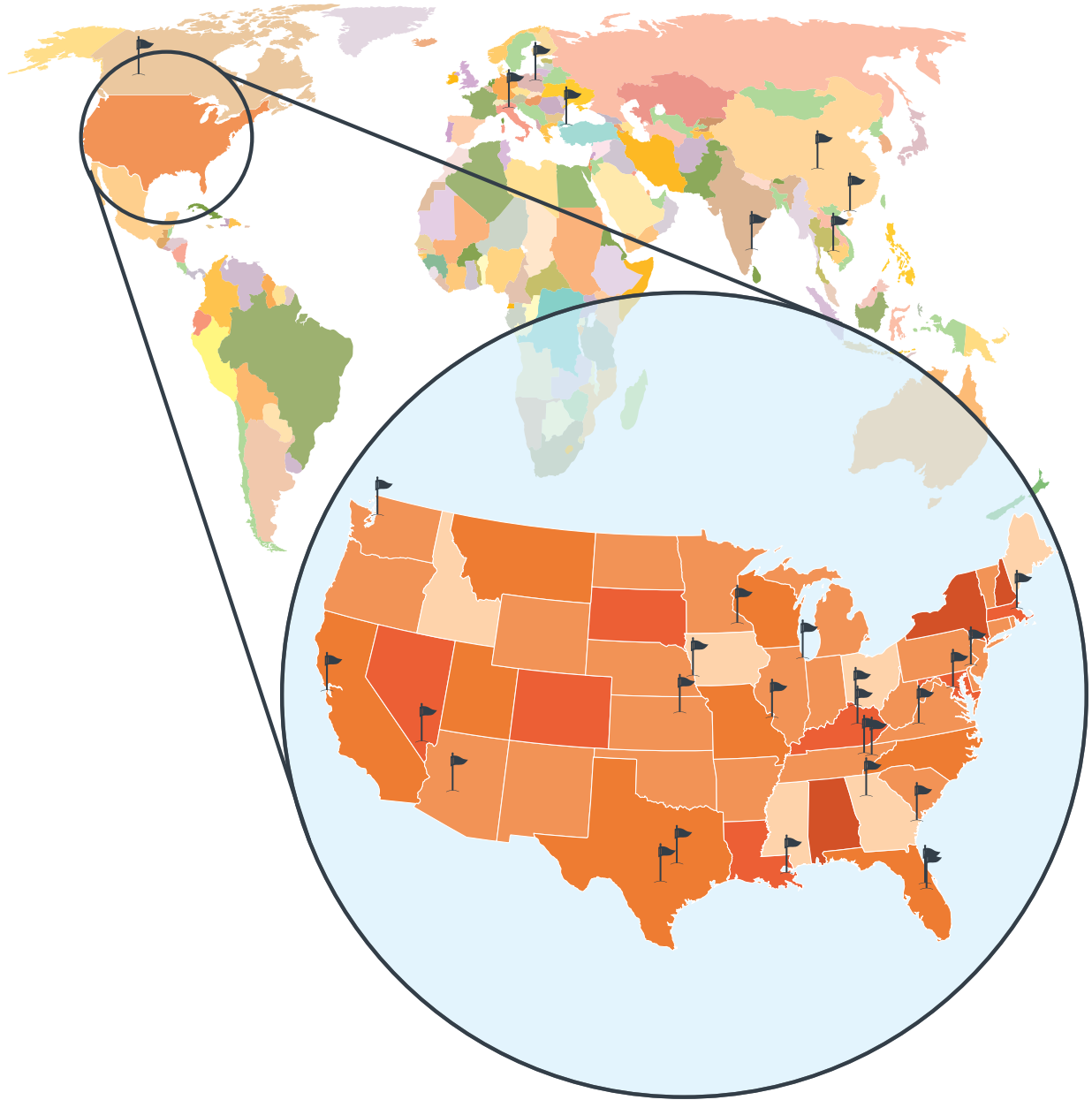
**Presentation:** Effects of local gentamicin delivery on tissue-implant interfaces

**Mentor:** Dr. David Anderson

**Cash award:** \$250.00



# Dissemination of Research



Center of Excellence faculty are strongly encouraged to disseminate their research discoveries through publications, presentations at scientific meetings, presentations of posters, and participation in scientific meetings. A complete list of faculty publications and presentations is included in this annual report for the calendar year 2019. The thirteen funded faculty members of the Center of Excellence had a total of sixty-three publications. Fifty-nine of these publications were peer-reviewed scientific articles, and four of these publications were book chapters. In addition to these published works, Center of Excellence faculty were represented in 105 presentations including oral presentations, abstracts, and posters. Presentations occurred locally, and at the state, national, and international levels. Above, you will see a world map indicating the locations of meetings at which faculty presented their work. In addition to these scholarly works, three invention disclosures were filed with the University of Tennessee Research Foundation in 2019, and one patent was filed for an invention designed to improve the precision and efficiency of end-to-end intestinal anastomosis.

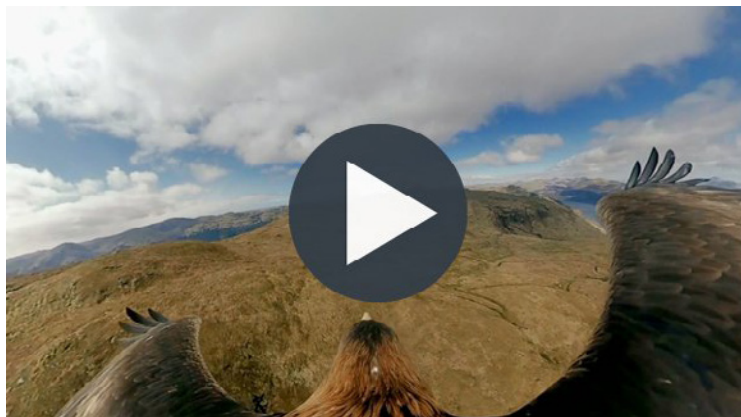
# Popular Press and Media

Faculty receiving support from the Center of Excellence in Livestock Diseases and Human Health participate in a wide range of outreach and education activities. Many of these activities involve presentation of research to professional audiences at scientific and continuing education meetings. In addition to faculty speaking engagements, the UTCVM issues press releases to state, regional, and national media on a regular basis, resulting in numerous television, radio, and print features. These are effective means by which activities related to research conducted through the Center of Excellence are communicated to stakeholders and the public at large.

A premier example of community engagement is the recurring, biweekly television spot, Channel 10's "Live at Five at Four" news show, on local NBC affiliate WBIR. The college also manages a Facebook page, VOLVet Connect alumni e-newsletter, and VOLVet News, a quarterly newsletter for referring veterinarians. Facebook page administrators post clinical and research information for users. As of October 2020, the UTCVM Facebook page had 13,130 "likes" from individuals. Also, an alumni Facebook page maintains connectedness with UTCVM alumni and this page has 1,400 "likes" as of October 2020. Furthermore, a farm animal and equine hospital page generated 2,022 "likes," and the Equine Performance and Rehabilitation Center resulted in 1,248 "likes" during the same time period. VOLVet Connect contains items of note aimed at DVM alumni, including UTCVM research news, continuing education, network opportunities, and a Comparative and Experimental Medicine graduate student research focus feature. UTCVM is active on Twitter (4,465 followers), has a YouTube channel with 903 subscribers, and has a Pinterest presence with 5,100 monthly viewers. The college's Instagram account has 2,112 followers. VOLVet Vision is a yearly magazine that explores the research, teaching, and outreach services of UTCVM. This year, the magazine highlighted the Class of 1979 and forty years of graduating veterinarians in Tennessee. The issue also covered the college's simulation program, global outreach programs, as well as some of the changes in delivering education due to COVID-19.

In May, Dr. Michael Jones was featured in "Eagle Power," a documentary about eagles that aired on NOVA, the most-watched prime time science series on American television, reaching an average of five million viewers weekly.

In these ways, the faculty representing the Center of Excellence in Livestock Diseases and Human Health can communicate newly discovered knowledge, promote research and education, and guide application of these discoveries.



<https://www.pbs.org/wgbh/nova/video/eagle-power/>



# Summer Student Research

In efforts to foster interest in biomedical research careers and enhance appreciation for scientific investigation, inquiry, and the acquisition of new knowledge, the Center once again provided opportunities for veterinary students to conduct research at UTCVM.

Twenty-one students participated in laboratory and field research and attended weekly professional development seminars, during which guest speakers addressed topics such as career opportunities in research, compliance issues in laboratory animal care, data visualization, science writing, scientific presentations, and the grant proposal process. Near the end of the ten-week program, the students presented their research findings to their colleagues and to UTCVM faculty and staff. Three students presented at the 2020 National Veterinary Student Symposium.

The Center fully funded nineteen student stipends for the Summer Student Research Program. A grant from Boehringer Ingelheim funded two students (Courtney Marquette and Kassandra Downing). Dr. Stephen Kania, a Center faculty member, coordinated the program alongside Dr. Linda Frank. Eleven UTCVM veterinary students who gained research experience in the summer program are currently enrolled in the college's DVM/PhD program.

To maximize student opportunities, the program is open to both Center and non-Center faculty. During FY20, five Center faculty members participated in the program. The Center continues to encourage the participation of its faculty in mentoring DVM students.



*Kassandra Downing, UTCVM Class of 2022, working on her summer project, Effects of local gentamicin delivery on tissue-implant interfaces. Kassandra was awarded the Phi Zeta Award for Excellence in Animal Health Research based on this work.*

## Allie Andrews

White House, TN | 2nd year

BS in Agriculture from Austin Peay State University

**Faculty Mentors:** Dr. Chika Okafor, & Dr. Brian Whitlock

**Summer Project:** Determining the Seroprevalence of Bovine Anaplasmosis in TN Cattle

**Career Interests:** Mixed animal general practice

## Blake Andrews

Spring Hill, TN | 3rd year

BS in Agriculture from the University of Georgia

**Faculty Mentors:** Dr. Andrew Cushing, & Dr. Mee-Ja Sula

**Summer Project:** Symmetric dimethylarginine (SDMA) in captive tigers

**Career Interests:** Anatomic pathology; academia

## Samantha Barbero

Massapequa Park, NY | 2nd year

BS in Marketing from Long Island University

**Faculty Mentors:** Dr. Silke Hecht, & Dr. Connie Fazio

**Summer Project:** Investigation of Nasal Lesions resulting in Cribriform Plate Destruction

**Career Interests:** Radiology

## Kelsey Carrier

Louisville, KY | 2nd year

BS in Biology and Biochemistry minor from Bellarmine University

**Faculty Mentors:** Dr. Melissa Kennedy, Dr. Debra Miller, Dr. Ashley Reeves, & Niloofar Khajeh Kazerooni

**Summer Project:** General health monitoring and disease surveillance of free ranging bobcat (*Lynx rufus*) and ocelot (*Leopardus pardalis*)

**Career Interests:** Exotic animal medicine

## Alec Daniels

Rockwood, TN | 3rd year

BS in Biological Sciences from the University of Georgia

**Faculty Mentor:** Dr. Pierre-Yves Mulon

**Summer Project:** Mechanical study of suture material and the effects of surgeon fatigue

**Career Interests:** Small Animal medicine, pathology

## Kassandra Downing

Yucaipa, CA | 3rd year

BS in Biology from Augusta University

**Faculty Mentors:** Dr. David Anderson, Dr. Madhu Dhar, & Dr. Lori Cole

**Summer Project:** Effects of local gentamicin delivery on tissue-implant interfaces

**Career Interests:** Laboratory animal medicine

## Erin Duble

Chattanooga, TN | 3rd year

BS in Biology from Grove City College

**Faculty Mentor:** Dr. Liza Köster

**Summer Project:** Usefulness of pulmonary arterial end-diastolic forward flow (EDFF) in predicting right ventricle remodeling in precapillary pulmonary hypertension and pulmonic stenosis in dogs

**Career Interests:** Small animal emergency and critical care

## Hannah Durick

Franklin, TN | 3rd year

BS in Anthropology from the University of Tennessee

BA in International Development from the University of Tennessee

MS in Biogeography from Texas A&M University

**Faculty Mentors:** Dr. Melissa Kennedy, & Dr. Becky Trout Fryxell

**Summer Project:** First steps to understanding the epidemiology of ticks and tick-borne agents in northwestern Zimbabwe

**Career Interests:** Residency in Zoological Medicine

## Emma Ellis

Harriman, TN | 2nd year

BS in Animal Science from the University of Tennessee

BA in Theology/Philosophy from Hardin-Simmons University

**Faculty Mentor:** Dr. Cassie Lux

**Summer Project:** Looking Back - A Summer of Retrospective Studies: "Comparison of outcome between cystoscopic-assisted cystotomy & open cystotomy" and "Evaluating infectious complications of total ear canal ablation"

**Career Interests:** Small animal medicine

## Chandler Hawk

Friendsville, TN | 2nd year

BS in Marketing with collateral in Entrepreneurship from the University of Tennessee

**Faculty Mentor:** Dr. Elizabeth Collar

**Summer Project:** Investigation of Lumbosacral Bone Density in Quarter Horses

**Career Interests:** Mixed animal general practice or small animal emergency and critical care

## Emily Kent

Parma, OH | 2nd year

BS in Animal Science and Biology from the University of Findlay

**Faculty Mentors:** Dr. Andrea Lear, & Dr. Chika Okafor

**Summer Project:** Control of Salmonella Dublin in a Dairy Herd

**Career Interests:** Zoological/exotic animal medicine

## Brian LaMendola

Jacksonville, FL | 3rd year

BS in Zoology from the University of Florida

**Faculty Mentor:** Dr. Rick Gerhold

**Summer Project:** A Retrospective Study on Elk Morbidity and Mortality in Tennessee

**Career Interests:** Veterinary pathology

## Zachary Lembersky

Knoxville, TN | 2nd year

BS in Neuroscience and Behavioral Biology from Emory University

**Faculty Mentor:** Dr. Adrien-Maxence Hespel

**Summer Project:** Development of a Novel Objective Assessment for Sacro-Iliac Luxation on Radiograph

**Career Interests:** Surgical residency

## Courtney Marquette

Cleveland, OH | 2nd year

BS in Biology from the University of South Carolina

**Faculty Mentor:** Dr. Debra Miller

**Summer Project:** Investigating the impact of climate change on leatherback sea turtle hatchling development

**Career Interests:** Small animal and wildlife medicine

## Nicholas Millis

Knoxville, TN | 2nd year

BS in Biochemistry Cellular and Molecular Biology from the University of Tennessee

**Faculty Mentor:** Dr. Agricola Odoi

**Summer Project:** Patterns and predictors of antimicrobial and multidrug resistance among *Staphylococcus* ssp. isolated from canine specimens submitted to UTCVM

**Career Interests:** Veterinary surgery or emergency and critical care

## Mary-Ables Ray

Jonesborough, TN | 3rd year

BS in Biology from Georgetown College

**Faculty Mentor:** Dr. Phil Jones

**Summer Project:** Effect of adding dexmedetomidine to bupivacaine solution on the duration of nerve blocks in horses

**Career Interests:** Equine private practice internship; ambulatory equine practitioner

## Leann Shaw

Norco, CA | 3rd year

BS in Biology from the University of Tennessee Riverside  
MS in Veterinary Biomedical Science from Lincoln Memorial University

**Faculty Mentor:** Dr. Darryl Millis

**Summer Project:** Effect of Therapeutic Taping on Gait and Selected Exercises in Dogs

**Career Interests:** Small animal surgery; orthopedic surgery

## Sayge Smith

Knoxville, TN | 3rd year

BS in Animal Science from the University of Tennessee

**Faculty Mentor:** Dr. Stephanie Kleine

**Summer Project:** Effects of Acepromazine and Butorphanol on Propofol Induction Dose in Dogs

**Career Interests:** Avian and exotic companion mammal specialist

## Robert Stilz

Signal Mountain, TN | 2nd year

BS in Animal Science/Pre-veterinary Medicine from Berry College

**Faculty Mentor:** Dr. Marcy Souza

**Summer Project:** Pharmacokinetics and Egg Residues of Oral Meloxicam in Bantam Cochin Chickens

**Career Interests:** Veterinary public health, zoonotic disease, One Health

## Mary Winemiller

Sarasota, FL | 2nd year

BS in Biology from the University of South Florida

**Faculty Mentor:** Dr. Becky Trout Fryxell

**Summer Project:** Reexamining the Ecology of the Most Prevalent Ticks in Eastern Tennessee via Surveillance of the Invasive Asian Longhorned Tick

**Career Interests:** Wildlife medicine, research, public health, conservation medicine

## Bonnie Wakefield

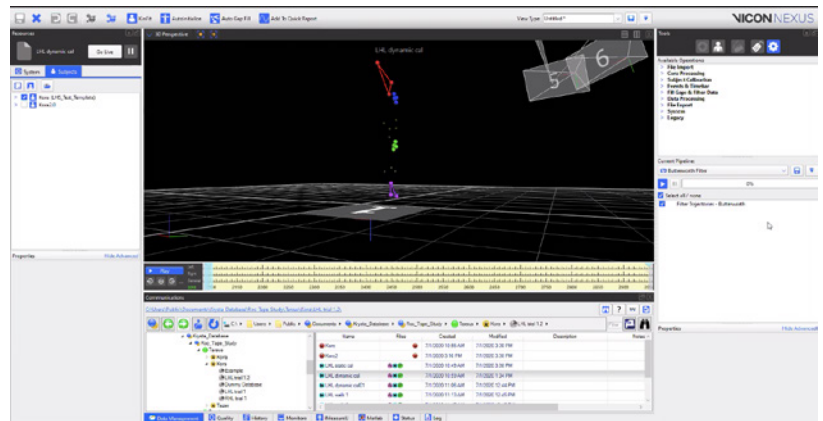
Fayetteville, TN | 2nd year

BS in Biology from Sewanee: The University of the South

**Faculty Mentors:** Dr. Zennithson Ng, Dr. Julia Albright, & Dr. Liza Köster

**Summer Project:** Effect of the veterinary visit on heart rate variability in dogs

**Career Interests:** Rural general practice; mixed animal medicine



Leann Shaw, UTCVM Class of 2022, demonstrating skin marker placement on a German Shepherd utilized for three-dimensional motion capture to analyze kinematic gait alterations secondary to the application of kinesiology tape.

# Three Minute Thesis

In April 2019, the final competition for the third annual University of Tennessee Three Minute Thesis (3MT) was held as a part of the University of Tennessee's Graduate and Professional Student Appreciation Week with the twelve winners of the semi-final competitions. The competition challenges master's and doctoral students to communicate their unique thesis or dissertation to an audience unfamiliar with the subject. Competitors have three minutes to explain their research using only one slide or photo. The College of Veterinary Medicine's Comparative and Experimental Medicine program had two participants in the competition, and one became the overall winner!

## *Overall Three Minute Thesis Winner*

### **Caroline Billings-Ziemba**

*DVM-PhD Candidate, College of Veterinary Medicine and CEM PhD program*

**Presentation:** Bone Regeneration:  
The Future of Fracture Repair

**Advisor:** Dr. David Anderson

Caroline said after working internships in the medical device field, she knew she'd found her niche.

"You can use the skill sets of being a veterinarian and also a researcher to impact a huge patient population of both animals and humans."



*Dr. Caroline Billings-Ziemba (right) with the other winners of the 3MT competition in April of 2019.*

*An outstanding presentation was also delivered by:*

### **Rachael Wolters**

*DVM-PhD candidate, College of Veterinary Medicine and CEM PhD program*

**Presentation:** Epidemiological Analysis of Antimicrobial Resistance of Mastitis Cases in South African Dairy Herds

**Advisor:** Dr. Agricola Odoi







*Photo by Tory Salvador.*

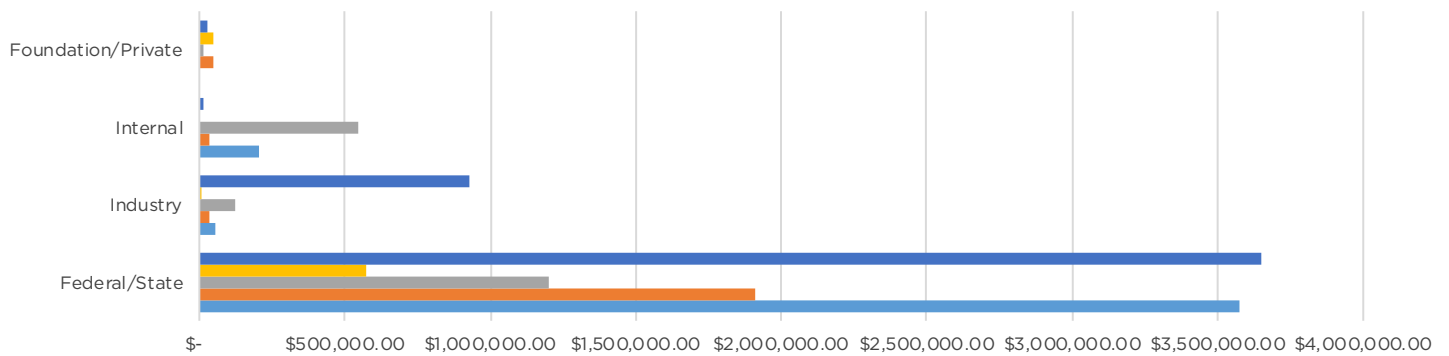
# Five-Year Benchmark Data

Scholarly productivity among COE faculty remains strong. Total publications, publications per faculty member, presentations nationally and internationally, and presentations per faculty member increased in calendar year 2019 compared to calendar year 2018. Faculty published fifty-nine peer-reviewed journal articles, four book chapters. Faculty also participated in and created 105 presentations, posters, and published abstracts.

Although the total number of grant awards received in FY20 decrease as compared to previous years, there was a significant increase in the total value of awards received. Grant proposals were most often made to federal and state agencies, with a smaller number of proposals being submitted to industries and foundations. Awards were most often secured from federal and state agencies, and fewer industry awards were secured. The external grant awards amounted to over \$3.6 million in FY20, which is a significant increase compared to the past three years. Research expenditures declined slightly from the previous year, partly as a result of shutting down research laboratories in the last four months of FY20 as a result of the COVID-19 pandemic.

Center of Excellence faculty continue to be strongly engaged in the mentoring of graduate and professional students in research. The Summer Student Research Experience Program engaged twenty-one veterinary students in laboratory and field research projects. Faculty across multiple disciplines mentored students throughout the Summer Student Research Experience Program.

**Research Funding by Source: FY16-FY20**

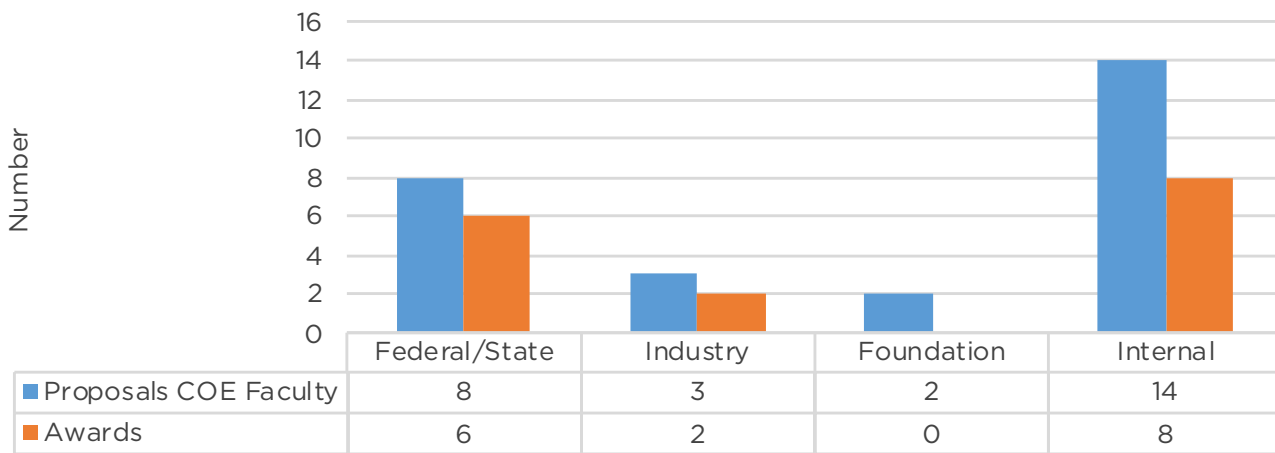


	Federal/State	Industry	Internal	Foundation/Private
■ FY16	\$3,652,672.00	\$928,591.00	\$17,200.00	\$31,000.00
■ FY17	\$575,610.00	\$7,438.00	\$-	\$47,532.00
■ FY18	\$1,199,153.00	\$124,430.00	\$546,430.00	\$15,000.00
■ FY19	\$1,907,177.00	\$37,766.00	\$35,768.00	\$47,082.00
■ FY20	\$3,574,356.00	\$57,876.00	\$207,077.00	\$-

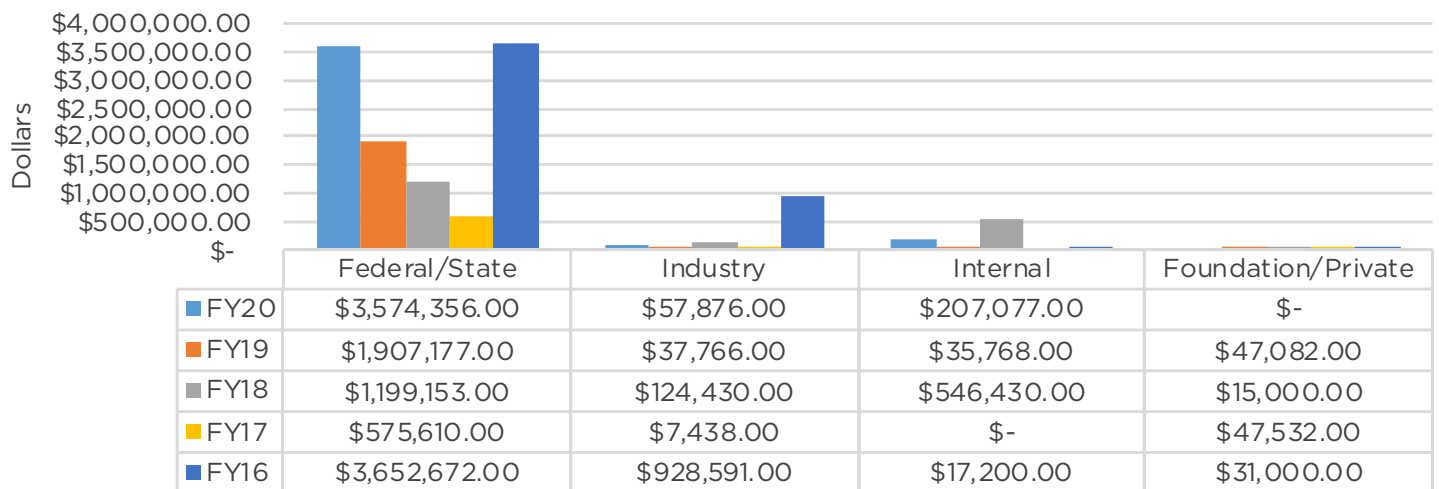
# Benchmark Summary

Despite the challenges experienced by Center of Excellence faculty during FY20, extramural funding success was strong relative to the total amount of funds awarded. During FY20, COE faculty submitted twenty-seven proposals and the number of successful awards totaled sixteen. The value of awards for FY20 from federal and state sources totaled \$3,632,232. This represents a two- to three-fold increase in extramural awards funding as compared with FY19, FY18, and FY17. Data from FY20 is skewed because of a single large grant of approximately \$2.6 million.

### Proposals and Awards FY20



### Awards FY16-20



# Future Plans: Looking Forward

The Center of Excellence in Livestock Diseases and Human Health (COE) continues to invest in its faculty, students, research, and infrastructure to support its mission. The Center faculty are dedicated to the continued development of interdisciplinary and multidisciplinary activities designed to promote the quality of human and animal life, expand research capacities for livestock research, explore commonalities between animal diseases and human diseases that have mutual benefit for the advancement of both, and develop new strategies for the diagnosis, treatment, and prevention of disease. Two important programs established at the university exemplify the Center's mission: the Genomics Center for the Advancement of Agriculture and the One Health Initiative.

FY20 was a year of transition and turbulence for the COE. The COVID-19 pandemic resulted in significant limitations in graduate education and research. Many laboratories shut down completely for more than four months. Although some laboratory groups continued to work, research efforts were significantly curtailed, which led to significant reductions in research expenditures during the fiscal year. The effect of the pandemic on research activities continues to be felt in FY21. Most laboratories and research groups have returned to work under restrictions of the COVID-19 disease prevention strategies. Also, FY20 included multiple retirements and relocations of research faculty, as well as multiple protracted faculty searches in core areas of research for the COE. Several new research-oriented faculty have been hired with great expectations for increasing extramural-supported research, training of graduate students and veterinary students, scholarly activities, and the graduate curriculum and programs. These faculty will have key roles in dissemination of new knowledge to stakeholders including scientists, practitioners, producers, and the public.

New faculty hires support the growing areas of focus in the COE including infectious disease and immunology and regenerative and rehabilitation medicine. Dr. Elizabeth Collar is a new research faculty member whose focus is musculoskeletal disorders. Her expertise is complementary to the regenerative and rehabilitation medicine focus. Drs. Sreemari Rajeev and Michelle Dennis are newly hired research faculty with expertise in infectious disease and pathologic basis of disease. Dr. Rajeev will focus her research on leptospirosis, a debilitating and potentially fatal bacterial disease of people and animals. Dr. Dennis's present research involves aquatic wildlife focusing on species of ecological and economic importance. These faculty members support the growing strength in the COE's focus in infectious disease and immunology. In January 2021, Dr. Neelakanta and Dr. Sultana will join the college as infectious disease experts. These faculty are well-established and will immediately begin work on current R01 awards from NIH in the areas of vector-borne disease. An additional search is ongoing for an infectious disease virologist and immunologist. These faculty bring great strengths to the COE, and it is our expectation that grant submissions, grant awards, and research expenditures will significantly increase in FY21.

During FY20, the COE worked collaboratively with AgResearch to secure a contract with Hanover Research. Hanover specializes in assisting faculty in identifying grant mechanisms that are most likely to advance their work. This organization also aids researchers in refining the structure of their grants to maximize their competitiveness for awards. This initial year of the contract was successful in assisting multiple faculty, and the contract has been extended for another year. Several faculty have already requested support from Hanover in the development of their federal grant proposals.

**FACULTY  
RESEARCH  
SUMMARIES**

# Dr. David Anderson

PROFESSOR, ASSOCIATE DEAN FOR RESEARCH & GRADUATE STUDIES  
UTCVM RESEARCH ADMINISTRATION AND LARGE ANIMAL CLINICAL SCIENCES

## About Dr. Anderson

### MS

Kansas State University

### DVM

North Carolina  
State University

### Supported by:

Department of Defense,  
National Institutes of  
Health, National Science  
Foundation, Food & Drug  
Administration, & the  
Center of Excellence

### Collaborators:

Drs. Madhu Dhar, Dustin  
Crouch, Pierre-Yves Mulon,  
Stephen Kania, Silke Hecht,  
& Sherry Cox

### Collaborators:

Rebecca Rifkin, Remi  
Grześkowiak, Alisha  
Pedersen, & Caroline  
Billings-Ziemba

### Publications:

9 in 2019

### Book Chapters:

1 in 2019

### Presentations:

20 in 2019

### Invention Disclosures:

3 in 2019

### Patents Filed:

1 in 2019



### COE SEED FUND RESEARCH:

Determination of the mechanisms associated with *Staphylococcus aureus* isolated from cases of hypertrophic osteomyelitis

Dr. Anderson's research focuses around tissue regeneration and the use of regenerative technologies to restore form and function to injured structures in the body. To advance this work, he worked with a large team of collaborators to discover new knowledge, mentor graduate students and early career faculty, and disseminate that knowledge via publications and presentations. Dr. Anderson has had a long collaborative relationship with the Center for Integrative Nanotechnology Sciences at the University of Arkansas at Little Rock, which is under the direction of Dr. Alexandru Biris. This collaboration has resulted in successful awards from the Department of Defense through the Army military research programs. In 2019, collaborators received two federal grants worth over \$6 million to advance bone regeneration technology. In recent years, a new collaboration with Dr. Dustin Crouch, biomedical engineer in the College of Engineering at the University of Tennessee, is focusing on restoring injured warriors and citizens who have suffered amputations to a more normal function and quality of life. A common complication in clinical patients is infection, and Dr. Anderson's team received a Center of Excellence grant in 2019 to study the mechanisms associated with osteomyelitis associated with *Staphylococcus aureus*. Specifically, this grant is designed to conduct a genomic analysis of *Staphylococcus aureus* and explore the mechanisms by which this bacteria gains entry into bone cells and causes changes in cell function. Dr. Anderson's work is translational in nature and works with animals to improve the health and well-being of people.

# Dr. Marc Caldwell

ASSOCIATE PROFESSOR  
UTCVM LARGE ANIMAL CLINICAL SCIENCES



## COE SEED FUND RESEARCH:

Effect of ethyl pyruvate on the inflammatory response and neutrophil function in neonatal calves

Dr. Caldwell's research focuses on immunology and infectious disease of livestock and the potential use of these species for translational research to humans. In his current COE research, Dr. Caldwell and his team proposed studying the effect of ethyl pyruvate on inflammatory responses and white blood cell function in neonatal calves. Bacterial infections of the bloodstream, and especially toxins being spread systematically through the bloodstream, are important causes of inflammatory response syndrome, which is often associated with multiple organ failure in humans and animals. This research hopes to discover a new treatment for the control of overwhelming inflammatory responses to these bacterial toxins. Ethyl pyruvate is a small-molecule inhibitor that might be useful in the treatment of systemic inflammatory disease. Ethyl pyruvate may work through the inhibition of transcriptional regulators of the inflammatory response. This has the potential to significantly advance the field of immunology, infectious disease, and inflammatory disorders.

## About Dr. Caldwell

MS, DVM, PhD  
Auburn University

*Supported by:*  
United States Department  
of Agriculture, the  
Center of Excellence, &  
BioMerieux Inc.

*Collaborators:*  
Drs. Vincent Dore  
& Stephen Kania

*Publications:*  
2 in 2019

*Presentations:*  
5 in 2019

*Book Chapters:*  
1 in 2019

# Dr. Vermont Punongba Dia

ASSISTANT PROFESSOR  
UT FOOD SCIENCE

## About Dr. Dia

**PhD**

University of Illinois at  
Urbana-Champaign

**MS**

University of the  
Philippines

**Supported by:**

United States Department  
of Agriculture, the Center  
of Excellence, &  
BioMerieux Inc.

**Collaborators:**

Dr. Mee-Ja Sula

**Publications:**

5 in 2019

**Presentations:**

7 in 2019

**Book Chapters:**

1 in 2019

**Honors in 2019:**

Outstanding  
Undergraduate Research  
Mentoring Award  
*University of Tennessee  
Herbert College of  
Agriculture*



**COE SEED FUND RESEARCH:**

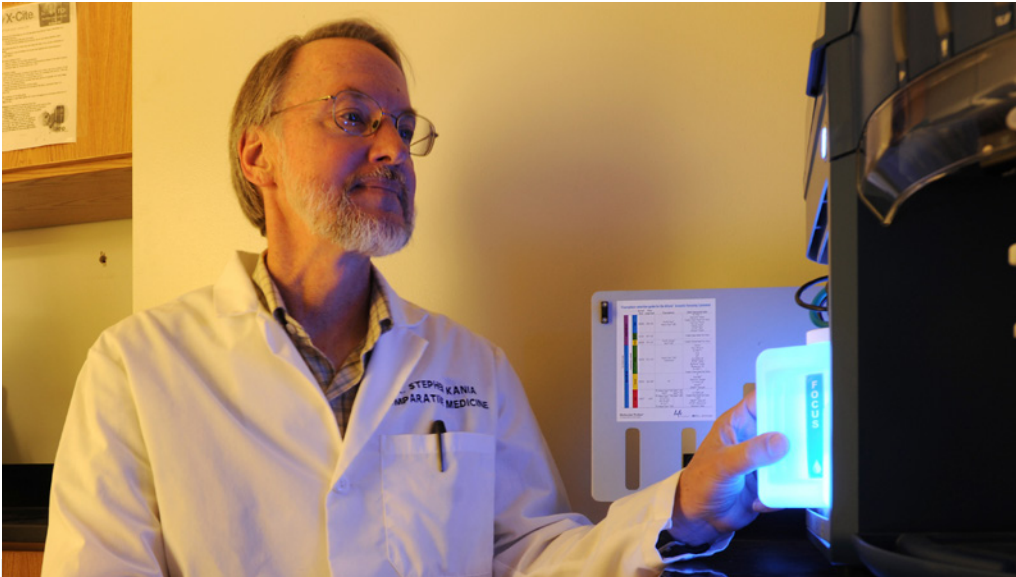
Management of colitis by lunasin-enriched material in mouse model

Dr. Dia's research focus includes evaluation of health-promoting properties of food constituents, utilizing food processing coproducts as sources of novel food ingredients, and determining the mechanisms by which bioactive peptides and phenolics prevent and manage diseases. His current COE funded research is focused on finding a treatment for inflammatory bowel disease. Inflammatory bowel disease is extremely common in humans and animals, and Dr. Dia's team proposed to study a bioactive peptide, Lunasin. Inflammatory bowel disease in people in the United States results in over two million physician visits, nearly 200,000 hospitalizations, and over \$30 billion in annual healthcare costs. Lunacin is a peptide, isolated from soybeans, that has been proposed to have some type of anti-inflammatory property.



# Dr. Stephen Kania

PROFESSOR, ASSISTANT DEAN FOR RESEARCH & GRADUATE STUDIES  
UTCVM RESEARCH ADMINISTRATION AND BIOMEDICAL AND DIAGNOSTIC SCIENCES



## About Dr. Kania

**MS**  
Washington State University

**PhD**  
University of Florida

**Supported by:**  
American Kennel Club  
Canine Health Foundation,  
Boehringer-Ingelheim, &  
the Center of Excellence

**Collaborators:**  
Drs. Marc Caldwell  
& Chika Okafor

**Publications:**  
14 in 2019

**Presentations:**  
3 in 2019

**Honors in 2019:**  
Zoetis Award for Veterinary  
Research Excellence

### COE SEED FUND RESEARCH:

Chimeric Attenuated Virulence Factor Vaccine for *Staphylococcus pseudintermedius* Canine Pyoderma

Dr. Kania's research focuses on genetic characterization, antimicrobial resistance, and methods to treat and prevent staphylococcal infections. His research occupies a niche at the interface between immunology, molecular microbiology, and bacteriology. The approaches used by his research group include genome sequencing, transcriptome analysis, mass spectrometry analysis, identification of bacterial proteins involved in immune dysfunction, and production of attenuated recombinant virulence proteins using synthetic genes. Protein function is determined using recombinant proteins, phenotypic assays, and attenuated recombinant proteins. This work has culminated with a six-component vaccine for *Staphylococcus pseudintermedius*, which is currently in a clinical trial. The goal of his present research is to develop a chimeric protein composed of important components of all six proteins to create a more cost-efficient vaccine for dogs. This research will also help serve as a model for human vaccines.

# Dr. Andrea Lear

ASSISTANT PROFESSOR  
UTCVM LARGE ANIMAL CLINICAL SCIENCES

## About Dr. Lear

PhD

University of Tennessee

MS

Colorado State University

DVM

Auburn University

### *Supported by:*

United States Department  
of Agriculture, National  
Institute of Food and  
Agriculture, & the Center of  
Excellence

### *Presentations:*

12 in 2019

### *Honors in 2019:*

Zoetis Distinguished  
Veterinary Teacher Award

Large Animal  
Clinician of the Year  
*University of Tennessee  
College of Veterinary  
Medicine*

Charles and Julie  
K. Wharton Faculty  
Development Award



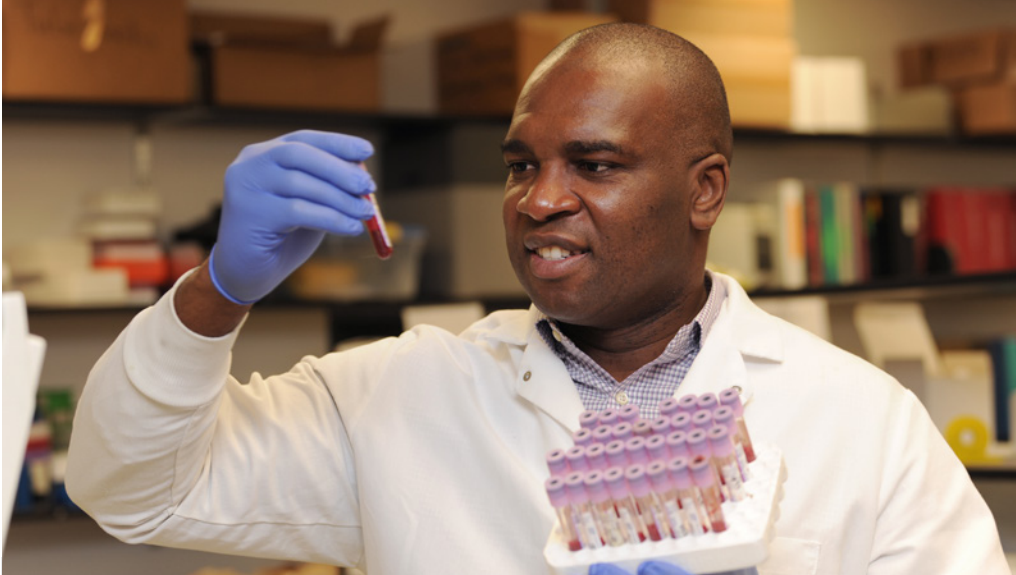
### **COE SEED FUND RESEARCH:**

Viral Trojan Horse: Does exosome formation mediate BVDV transmission to susceptible cells?

Dr. Lear's research focuses on understanding the impact of viral infection and inflammation during times of pregnancy. This includes alteration of maternal-fetal interactions, placental immunology, and neonatal outcomes such as epigenetics. Dr. Lear utilizes pregnant ruminants models to understand these effects for both livestock and human health and well-being.

# Dr. Chika Okafor

ASSISTANT PROFESSOR  
UTCVM BIOMEDICAL AND DIAGNOSTIC SCIENCES



## COE SEED FUND RESEARCH:

Prevalence of antibiotic residues in selected foods of animal origin at farmers' markets in East Tennessee (USDA-NIFA)

Dr. Okafor's research focuses on the use of antimicrobials in animals and concerns regarding development of antimicrobial drug resistance by microorganisms. Many Tennessee cattle producers believe the FDA's Veterinary Feed Directive might lead to the overuse of injectable antimicrobials in animals and increased antibiotic residues in animal products. This overuse may lead to development of antimicrobial resistance in bacteria and increase risk of exposure in consumers. The prevalence of antibiotic residues in foods of animal origin and the effects of consumer cooking on antibiotic residues are unknown. Anecdotally, cattle producers believe products sold at farmers' markets are more likely to contain antibiotic residues due to minimal regulatory oversight. This research will determine the safety of animal products from farmers' markets and the effects of consumer food preparation on antibiotic residues.

## About Dr. Okafor

MS, PhD  
Michigan State University

DVM  
University of Nigeria

*Supported by:*  
CRDF Global, United States  
Department of Agriculture,  
National Institute of Food  
and Agriculture, & the  
Center of Excellence

*Publications:*  
6 in 2019

*Presentations:*  
14 in 2019

# Dr. Liesel Schneider

ASSISTANT PROFESSOR  
UT ANIMAL SCIENCE

## About Dr. Schneider

PhD  
Mississippi State University

### *Supported by:*

United States Department  
of Agriculture Animal and  
Plant Health Inspection  
Service, United States  
Department of Agriculture  
National Institute of Food  
and Agriculture, United  
States Department of  
Agriculture  
Agriculture and Food  
Research Initiative, & the  
Center of Excellence

### *Collaborators:*

Drs. Marc Caldwell  
& Andrea Lear

### *Publications:*

9 in 2019

### *Presentations:*

25 in 2019



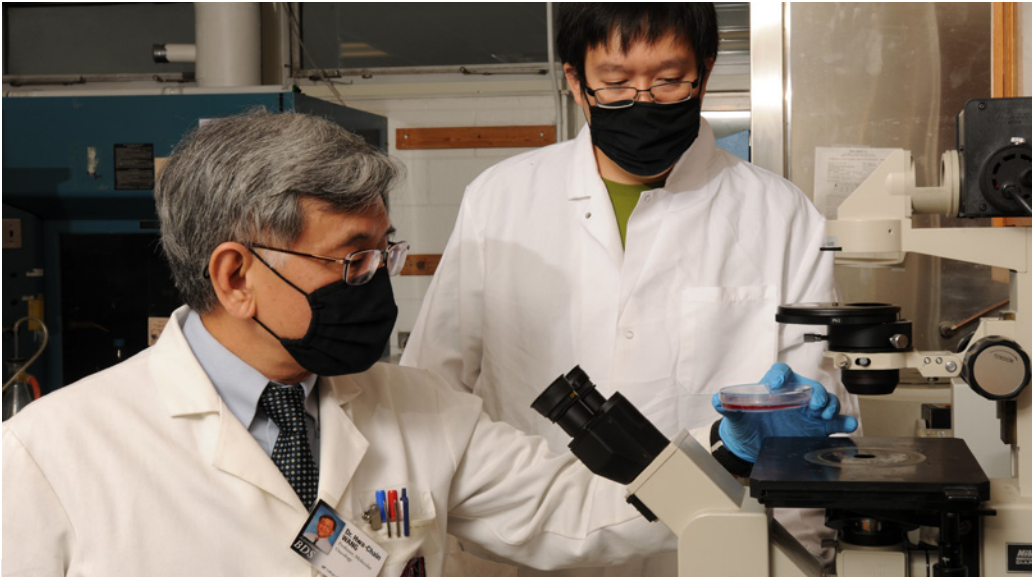
### **COE SEED FUND RESEARCH:**

Implementation of a novel biosensor for early respiratory disease detection in beef stocker cattle

Diagnosis of bovine respiratory disease (BRD) in cattle is largely based upon visual observation of clinical signs. Recognition of developing disease early on in the course of the disease will allow for timely treatment, less reliance on antibiotics, and optimum recovery rates. Biosensors can be used to record activity and location of cattle, and based upon these data, early disease detection is possible. Dr. Schneider's current research aims to monitor behavioral changes in stocker calves associated with BRD using a novel biosensor collar. Also, the research studies monitor the nasopharyngeal microbiome for illness associations. Accelerometer and global positioning system data is collected from stocker cattle on a commercial operation in Tennessee. Biomarkers and nasopharyngeal samples are collected periodically throughout the study to determine correlations between behavior and physiological parameters. Development of novel techniques for earlier BRD diagnosis aid the beef industry through improved clinical outcomes and antimicrobial stewardship.

# Dr. Hwa-Chain Robert Wang

PROFESSOR  
UTCVM BIOMEDICAL AND DIAGNOSTIC SCIENCES



## COE SEED FUND RESEARCH:

A metastatic tumor animal model for anticancer therapeutics

## Advancing Bladder Cancer Treatment

Urothelial carcinoma, also known as bladder cancer, accounts for more than ninety percent of urinary bladder cancer cases. The incidence of these cancers have been increasing for the past ten years in the US, reaching 80,470 new cases and an estimated 17,670 deaths in 2019. Conventional surgical treatment, chemotherapy, and immunotherapy are effective short-term treatments, but more than 50% of bladder cases recur and progress to life-threatening, advanced muscle-invasive cancer. Dr. Wang has developed a new approach using a combination drug regimen for control of metastasis of these cancer cells; he is currently testing the approach. Using a triple combination of the FDA-approved anticancer agents (gemcitabine, romidepsin, and cisplatin) may be effective in controlling bladder cancer cells. He hopes to demonstrate the efficacy of this rationalized Gem+Rom+Cis regimen in the control of Urothelial carcinoma metastasis in vivo using mouse models of bladder cancer.

## About Dr. Wang

DVM  
National Chung-Hsing  
University (Taiwan)

MS  
Auburn University

PhD  
University of Virginia

*Supported by:*  
The Center of Excellence

*Collaborators:*  
Drs. Robert Donnell  
& Agricola Odoi

*Publications:*  
3 in 2019

*Presentations:*  
11 in 2019

**PUBLICATIONS  
AND  
PRESENTATIONS**

# Dr. Jonathan Abbott

## PUBLICATIONS

- Fox PR, Keene BW, Lamb K, Schober KE, Chetboul V, Luis Fuentes V...**Abbott JA** (10) et al. Long-term incidence and risk of noncardiovascular and all-cause mortality in apparently healthy cats and cats with preclinical hypertrophic cardiomyopathy. *J Vet Intern Med.* 2019 Nov;33(6):2572-86.
- Gudenschwager EK, **Abbott JA\***, LeRoith T. Dilated cardiomyopathy with endocardial fibroelastosis in a juvenile Pallas cat. *J Vet Diagn Invest.* 2019 Mar;31(2):289-93.
- Waterman MI, **Abbott JA\***, De Rezende AE, Wilcke JR. Duration of beta-adrenoceptor blockade associated with once-daily oral administration of atenolol in healthy dogs. *Am J Vet Res.* 2019 Mar;80(3):270-4.

## BOOKS & BOOK CHAPTERS

- Abbott JA.** Heart failure, Acute/Decompensated Heart Failure In: Cohn L, Cote E (eds). *Veterinary Clinical Advisor 4th Edition.* Philadelphia, Elsevier 2019.
- Abbott JA.** Heart Failure, Chronic Failure In: Cohn L, Cote E (eds). *Veterinary Clinical Advisor 4th Edition.* Philadelphia, Elsevier 2019.

## PRESENTATIONS

- Franchini A, **Abbott J**, Tyrrell W, Rosenthal S, Lahmers S, Menciott G, Crosara S, Häggström J, Borgarelli M. Predictors of reoccurrence of congestive signs in dogs with ACVIM-Stage C myxomatous mitral valve disease (MMVD). (Abstract) 2019 ECVIM-CA Congress, Milano, Italy.
- Menciott G, Borgarelli M, Aherne M, **Abbott J.** Accuracy of noninvasively determined pulmonary artery pressure in dogs with myxomatous mitral valve disease (MMVD) (Abstract) 2019 ECVIM-CA Congress, Milano, Italy.
- Management of Canine Heart Failure - Feline Cardiomyopathies: An Update, Dec 3, 2019, UTCVM Henton Veterinary Conference, Knoxville, TN.

# Dr. David Anderson

## PUBLICATIONS

- Bow A, Newby S, Jackson BK, Matavoslan A, Griffin C, King W, Alghazali K, Mhannawee A, Berryhill SB, Morello R, Hecht S, Biris AS, **Anderson DE**, Bourdo SE, Dhar M. Evaluation of a polyurethane platform for delivery of nanohydroxyapatite and decellularized bone particles in a porous three-dimensional scaffold. *ACS Applied Bio Materials.* 2019 Mar 26;2(5):1815-29. doi/abs/10.1021/acsabm.8b00670.
- Steiner R, Dhar MS, Stephenson S, Newby S, Bow A, Pedersen A, **Anderson DE.** Comparison of biometric data between Lewis and Sprague Dawley Rats. *Frontiers in Veterinary Science.* *Front Vet Sci.* 2019 Dec 20;6:469. doi: 10.3389/fvets.2019.00469.
- Bow A, **Anderson DE**, Dhar M. Commercially available bone graft substitutes: the impact of origin and processing on graft functionality. *Drug Metabolism Reviews* 2019;51(4):533-544.
- Graves MT, Castro JR, **Anderson DE.** Veterinary Intern Program for Entrustable Professional Activities Skills, a.k.a. Intern Boot Camp. *JVME* 2019. *J Vet Med Educ.* 2019 Jun 13:1-6. doi: 10.3138/jvme.0518-066r. Published on-line: <https://doi.org/10.3138/jvme.0518-066r>.
- Rifkin RE, Grześkowiak RM, Mulon PY, Adair HS, Biris AS, Dhar M, **Anderson DE.** Use of a pressure-sensing walkway system for biometric assessment of gait characteristics in goats. *PLoS One.* 2019 Oct 16;14(10):e0223771. doi: 10.1371/journal.pone.0223771; PMID: PMC6795426.
- Mulon, P., Snowden, RT., Videla, R., **Anderson, DE.** (2019) Biaxial proximal interphalangeal joint hyperflexions in a five-year-old Holstein bull *Veterinary Record Case Reports* 7: e000846. <http://dx.doi.org/10.1136/vetreccr-2019-000846>.
- Alghazali K, Hamzah R, Nima Z, Steiner R, Dhar M, **Anderson DE**, Hayar A, Griffin R, Biris A. Plasmonic nanofactors as switchable devices to promote or inhibit neuronal activity and function. *Nanomaterials (Basel).* 2019 Jul 18;9(7). pii: E1029. doi: 10.3390/nano9071029.
- Grześkowiak R.M, Wheeler C, Taylor E, Lillich J, Roush J, Biris A.S., **Anderson D.E.** Biomechanical evaluation of peak reverse torque (PRT) in a dynamic compression plate-screw construct used in a goat tibia segmental defect model. *BMC Veterinary Research* 2019;15:321 (1-5). <https://doi.org/10.1186/s12917-019-2058-7>.

## BOOKS & BOOK CHAPTERS

- Anderson DE**, Mulon PY. Anesthesia and Surgical Procedures in Swine. In: Zimmerman JJ, Karriker LA, Ramirez A, Schwartz KJ, Stevenson GW, Zhang J eds. *Diseases of Swine*, 11th edition. Wiley-Blackwell publishing. 2019, Chapter 11: 171-196.

## PRESENTATIONS

- C-section in small ruminants under field conditions. UTCVM VPAC July 2019.
- Hall PT, Bratcher S, Nelson A, Rifkin R, Burton B, Stephenson SM, Greenacre C, **Anderson DE**, Crouch DL Early Research Toward A Muscle-driven, Implantable Limb Prosthesis. Military Health Science Research Symposium, Aug 19-22, 2019, Orlando, FL. POSTER.
- Hall PT, Bratcher S, Rifkin R, **Anderson DE**, Greenacre C, Stephenson SM, Crouch DL. Implanting an Unjointed Endoprosthesis in the Rabbit Hindlimb: A Feasibility Study. Biomedical Engineering Society Annual Meeting, October 16-19, 2019, Philadelphia, PA.
- Rebecca Rifkin, Remiguisz Grzekowiak, Austin Bow, Bailey Jackson, Karrer Alghazali, Liesel Schneider, H. Steve Adair, Pierre-Yves Mulon, Silke Hecht, Madhu Dhar, David Harper, Shawn Bourdo, Alexandru Biris, **David Anderson**. Long-term Osseointegration Assessment of a Synthetic Bone Graft Scaffold using a Goat Segmental Defect Model. ACVS Surgery Summit, Las Vegas, NV October 17-19, 2019.
- Remigiusz M. Grześkowiak, Rebecca E. Rifkin, Pierre-Yves Mulon, David P. Harper, H. Steve Adair, **David E. Anderson**. Biomechanical testing of suture anchors used in repair of equine metacarpophalangeal joint collateral ligaments: ex vivo study, single cycle to failure. ACVS Surgery Summit, Las Vegas, NV October 17-19, 2019.
- Austin Bow, Karrer Alghazali, Steven Newby, Christopher Griffin, Silke Hecht, Alexandru Biris, **David Anderson**, Shawn Bourdo, Madhu Dhar. Comparative Analysis of Osteogenic Platforms in the Regeneration and Repair of Rodent Mandibular Defects. CEM Research Day, UTCVM, Knoxville, TN. Sept. 30, 2019. [https://vetmed.tennessee.edu/research/Pages/CEM\\_Research\\_Symposium.aspx](https://vetmed.tennessee.edu/research/Pages/CEM_Research_Symposium.aspx).
- Coates Desmond, Rifkin Rebecca, Dhar Madhu, **Anderson David**, Mulon Pierre-Yves. Preliminary investigation of graphene impregnated bone regeneration scaffold for simultaneous dental implantation in a goat mandible defect model. CEM Research Day, UTCVM, Knoxville, TN. Sept. 30, 2019. [https://vetmed.tennessee.edu/research/Pages/CEM\\_Research\\_Symposium.aspx](https://vetmed.tennessee.edu/research/Pages/CEM_Research_Symposium.aspx).
- Laura Freeman, Pierre-Yves Mulon, Remigiusz Grześkowiak, Alisha Pedersen, Rachel Clark, **David Anderson**. Comparison of acute load to failure testing of goat femoral neck fractures, ex vivo, repaired using 4.0-mm solid, cannulated, or enhanced cannulated cancellous bone screws. CEM Research Day, UTCVM, Knoxville, TN. Sept. 30, 2019. 3rd Place Award veterinary student category. [https://vetmed.tennessee.edu/research/Pages/CEM\\_Research\\_Symposium.aspx](https://vetmed.tennessee.edu/research/Pages/CEM_Research_Symposium.aspx).
- Remigiusz M. Grześkowiak, Rebecca E. Rifkin, Bailey Jackson, Pierre-Yves Mulon, Austin J. Bow, Reza Seddighi, Thomas Doherty, Silke Hecht, Shaun E. Bourdo, Madhu S. Dhar, H. Steve Adair, Alexandru S. Biris, **David E. Anderson**. Assessment of a 3D Hydrophilic Polyurethane Scaffold containing nano-HA and bone particles, with or without BMP2 or mesenchymal stem cells, on Bone Regeneration and Neovascularization of massive (> 5cm) segmental defects. CEM Research Day, UTCVM, Knoxville, TN. Sept. 30, 2019. 1st Place Award graduate student category.
- Steven D. Newby, Christopher Forsyth, **David Anderson** and Madhu Dhar. 3D printed Low Oxygen Graphene- Poly Lactic-co-Glycolic Acid (PLGA) nanoengineered scaffold will create an environment suitable for mesenchymal stem cell proliferation and differentiation for osteogenesis and angiogenesis for orthopedic repair. CEM Research Day, UTCVM, Knoxville, TN. Sept. 30, 2019.
- Alisha Pedersen, **David Anderson**, Karrer Alghazali, Alexandru Biris, Pierre-Yves Mulon, Rebecca Rifkin. Next generation, rapidly degradable anastomotic guide for enhanced surgical technique for end-to-end small intestinal anastomosis. CEM Research Day, UTCVM, Knoxville, TN. Sept. 30, 2019. 2nd Place Award graduate student category.
- Rebecca Rifkin, Remiguisz Grzekowiak, Austin Bow, Bailey Jackson, Karrer Alghazali, Liesel Schneider, H. Steve Adair, Pierre-Yves Mulon, Silke Hecht, Madhu Dhar, David Harper, Shawn Bourdo, Alexandru Biris, **David Anderson**. Evaluation of 3D Bone Regeneration Scaffold. CEM Research Day, UTCVM, Knoxville, TN. Sept. 30, 2019.
- Kassandra Willoughby, Austin Bow, Steven Newby, Alisha Pedersen, **David E Anderson**, Madhu Dhar. Assessment of Osteoinduction of a 3D scaffold containing Nano-hydroxyapatite with or without decellularized bone particles and with or without BMP2. CEM Research Day, UTCVM, Knoxville, TN. Sept. 30, 2019.
- Crouch D, Nelson A, Bratcher S, Matavosian A, Stephenson SM, **Anderson DE**. Muscle Architecture Degeneration in the Residual Limb Following Amputation: A Pilot Study in Rabbits. Joint Meeting of International Society of Biomechanics and American Society of Biomechanics, July 31-August 4, 2019. Calgary, AB, Canada.
- Owen J. Schumacher, Jessica L. Klabnik-Bradford, **David.E. Anderson**, Matt D. Meisner, Pierre-Yves Mulon. Outcome of bulls having grafts for apical ligament enhancement for treatment of penile deviation. ACT 2019.
- Crouch D, Hall PT, Bratcher SZL, Greenacre CB, Stevenson S, **Anderson DE**. Early Research toward a Muscle-Driven, Implantable Limb Prosthesis. Military Health System Research Symposium 2019.
- Hall PT, Warrington G, **Anderson DE**, Greenacre C, Crouch DL. Noninvasive Biomechanical Gait Analysis of a Hindlimb Tenotomy in the Rabbit Model. Biomedical Engineering Society Annual Meeting, October 16-19, 2019, Philadelphia, PA.
- Matavosian A, Steiner R, Dhar M, Stephenson SM, Masi T, Alghazali K, Biris A, **Anderson DE**, Crouch DL. Muscle Response to Novel Biomimetic Scaffolds for Sciatic Nerve Regeneration. Biomedical Engineering Society Annual Meeting, October 16-19, 2019, Philadelphia, PA.
- Warrington G, Hall PT, **Anderson DE**, Greenacre C, Rifkin R, Crouch DL. Isometric Torque During Electrical Stimulation of Muscles Crossing The Ankle In A Rabbit Model Of Tenotomy. Biomedical Engineering Society Annual Meeting, October 16-19, 2019, Philadelphia, PA.



## INVENTION DISCLOSURES

Electrospun Poly-caprolactone Neuralwrap Surface Coated with Graphene Oxide. Steiner, **Anderson**, Harper  
Novel Delivery System for Topical Treatment. K. Tobias  
Development of a Serological Assay to Detect Parelaphostrongylus Tenius Infection in Animals Gerhold, Kania, Richards.

## PATENTS/PATENT APPLICATIONS

Biodegradable Intraluminal Small Intestinal Anastomotic Guide. Filed 7/12/19.

# Dr. Marc Caldwell

## PUBLICATIONS

Ekakoro JE, **Caldwell M**, Strand EB, et al. A survey of antimicrobial use practices of Tennessee beef producers. BMC Vet Res 2019;15:222. Provided assistance throughout study design and grant proposal.

## BOOKS & BOOK CHAPTERS

**Caldwell M**, L Strickland. Chapter: Animal Health and Biosecurity. Modern Beef Production: Integrative approaches with nutrition, reproduction, and genetics. Pan Stanford Publishing. In Preparation. Estimated Publishing Date: January 2019.

## PRESENTATIONS

Bacterial Infections of the Respiratory Tract in Cattle. AVMA National Convention. Washington, DC, 2019. 1 hour. Oral address. Invited.  
Bacterial Infections of the Gastrointestinal Tract in Cattle. AVMA National Convention. Washington, DC, 2019. 1 hour. Oral address. Invited.  
Therapeutic Strategies for Bacterial Infections in Cattle. AVMA National Convention. Washington, DC, 2019. 1 hour. Oral address. Invited.  
Antimicrobial Resistance: Mechanisms and Patterns in Bacterial Pathogens of Cattle. AVMA National Convention. Washington, DC, 2019. 1 hour. Oral address. Invited.  
Antimicrobial Use Patterns among Beef Producers in Tennessee. UT Beef and Forage Center Research Expo. Knoxville, TN. 2019. 0.5 hour. Oral address. Invited.

# Dr. Vermont Punongba Dia

## PUBLICATIONS

**Dia VP\***, Wang Z, Lin Y, Pangloli P. 2019. Comparative biological activities determination of aqueous extracts of hempseed oil and hempseed protein isolate production co-products. Journal of American Oil Chemists' Society. 96(11): 1265-1274.  
Nieto-Veloz A, Wang Z, Zhong Q, Krishnan HB, **Dia VP\***. 2019. BG-4 peptide from bitter melon (Momordica charantia) differentially affects inflammation in vitro and in vivo. Antioxidants 2019, 8, 175.  
**Dia VP\***, Bradwell J, Pangloli P. 2019. Sorghum Phenolics Inhibits Inflammation in Lipopolysaccharide (LPS)-Primed and Adenosine. Plant Foods for Human Nutrition. 74(3):307-315.  
Lin Y, Li B, Zhao J, Wei L, Wang Y, Wang M, **Dia VP\***, Meng X\*. 2019. Combinatorial effect of blueberry extracts and oxaliplatin in human colon cancer cells. Journal of Cellular Physiology. 234(10):17242-17253.  
Mullin G, Chey W, Crowe S, Freston Conference Faculty [Ananthakrishnan A, Garcia-Bailo B, Dellon E, DiBaise J, Fasano A, Haller E, Hamilton MJ, Klein S, Leibold B, Leung J, Lewis J, Nguyen L, Pandolfino J, Parrish CR, Scarlata K, Tack J, Frye J, Harer K, Zavallos V, Srinivasan S, Verma S, Jansson-Knodell C, **Dia V**, Rifkin S, Pace L.] 2020. Meeting Summary: 2019 James W. Freston Conference: Food at the Intersection of Gut Health and Disease. Gastroenterology. 159(1): 20-25.

## PRESENTATIONS

**Dia VP**. 2019. TGF- $\beta$ 1-induced chemoresistance is reversed by BG-4 peptide. 12th Rivkin-Centre Biennial Ovarian Cancer Research Symposium Location: Seattle, WA Date: Sep 13-15, 2018. Clinical Cancer Research. 25(22): S202. Meeting Abstract NT-091.  
Nieto-Veloz A, Zhong Q, **Dia VP**. 2019. Chemically-induced hypoxia promotes ovarian cancer chemoresistance. 12th Rivkin-Centre Biennial Ovarian Cancer Research Symposium Location: Seattle, WA Date: Sep 13-15, 2018. Clinical Cancer Research. 25(22): S214. Meeting Abstract NT-102.

Nieto-Veloza A, Wang Z, Zhong Q, Krishnan HB, **Dia VP**. Differential Effect of Bioactive Peptide BG-4 From Bitter Gourd Over In Vitro Inflammation Markers and In Vivo Induced Ulcerative Colitis. IFT19 New Orleans, LA, USA from June 2 - 5, 2019. (2nd place Nutraceutical & Functional Foods Division Graduate Student Poster Competition).

Matic S, D'Souza D, Wu T, **Dia VP**. Stability of bovine milk exosomes and their biological effect on proliferation of RAW 264.7 murine macrophages. IFT19 New Orleans, LA, USA from June 2 - 5, 2019.

Hong S, **Dia VP**, Zhong Q. Oral bioavailability and in vivo anti-colorectal cancer effects of apigenin nanoencapsulated with whey protein isolate. IFT19 New Orleans, LA, USA from June 2 - 5, 2019.

Camfield E, Reuter D, **Dia VP**. Physicochemical Effects of Enzymatic Hydrolysis on Quinoa. April 15-18, 2019. EURECA, University of Tennessee, Knoxville. Poster Presentation.

Shaunak A, Schumacker N, Nieto-Veloza A, **Dia VP**. Utilization of Tofu By-products as an Alternative Source of Bioactive Peptide Lunasin. April 15-18, 2019. EURECA, University of Tennessee, Knoxville. Poster Presentation.

## HONORS

Outstanding Undergraduate Research Mentoring Award, Herbert College of Agriculture The University of Tennessee, Knoxville, 59th Annual Awards Recognition Program and Reception, April 3, 2019.

# Dr. Alejandro Esteller-Vico

## PUBLICATIONS

Fernandes CB, Ball BA, Loux SC, Boakari YL, Scoggin KE, El-Sheikh Ali H, Cogliati B, **Esteller-Vico A\***. Uterine cervix as a fundamental part of the pathogenesis of pregnancy loss associated with ascending placentitis in mares. *Theriogenology*. 2019 Oct 14. pii: S0093-691X(19)30470-4. doi: 10.1016/j.theriogenology.2019.10.017. [Epub ahead of print] PubMed PMID: 31732164. \*Corresponding Author:

Boakari YL, Ali HE, Dini P, Loux S, Fernandes CB, Scoggin K, **Esteller-Vico A**, Lawrence L, Ball B. A High Protein Model Alters the Endometrial Transcriptome of Mares. *Genes (Basel)*. 2019 Jul 30;10(8). pii: E576. doi: 10.3390/genes10080576. PubMed PMID: 31366166; PubMed Central PMCID: PMC6723232.

El-Sheikh Ali H, Legacki EL, Loux SC, **Esteller-Vico A**, Dini P, Scoggin KE, Conley AJ, Stanley SD, Ball BA. Equine placentitis is associated with a downregulation in myometrial progesterin signaling†. *Biol Reprod*. 2019 Jul 1;101(1):162-176. doi: 10.1093/biolre/ioz059. PubMed PMID: 31107530.

Legacki EL, Scholtz EL, Ball BA, **Esteller-Vico A**, Stanley SD, Conley AJ. Concentrations of sulphated estrone, estradiol and dehydroepiandrosterone measured by mass spectrometry in pregnant mares. *Equine Vet J*. 2019 Nov;51(6):802-808. doi: 10.1111/evj.13109. Epub 2019 Apr 10. PubMed PMID: 30891816.

Dini P, El-Sheikh Ali H, Carossino M, C Loux S, **Esteller-Vico A**, E Scoggin K, Daels P, A Ball B. Expression Profile of the Chromosome 14 MicroRNA Cluster (C14MC) Ortholog in Equine Maternal Circulation throughout Pregnancy and Its Potential Implications. *Int J Mol Sci*. 2019 Dec 13;20(24). pii: E6285. doi: 10.3390/ijms20246285. PubMed PMID: 31847075.

Dini P, Norris J, Ali HE, Loux SC, Carossino M, **Esteller-Vico A**, Bailey E, Kalbfleisch T, Daels P, Ball BA. Landscape of Overlapping Gene Expression in the Equine Placenta. *Genes (Basel)*. 2019 Jul 2;10(7). pii: E503. doi: 10.3390/genes10070503. PubMed PMID: 31269762; PubMed Central PMCID: PMC6678446.

Dini P, **Esteller-Vico A**, Scoggin KE, Daels P, Ball BA. Extraction of RNA from formalin-fixed, paraffin-embedded equine placenta. *Reprod Domest Anim*. 2019 Mar;54(3):627-634. doi: 10.1111/rda.13406. Epub 2019 Feb 11. PubMed PMID: 30659674.

B. A. Ball, G. M. Davolli, **Alejandro Esteller-Vico**, Blaire Fleming, Michelle A. Wynn, A. J. Conley Inhibin-A and Inhibin-B in stallions: Seasonal changes and changes after down-regulation of the hypothalamic-pituitary-gonadal axis. *Theriogenology*. 2019 Jan 1;123:108-115. doi: 10.1016/j.theriogenology.2018.09.036.

## PRESENTATIONS

Bluegrass Equine Reproduction Symposium. Lexington KY; October 24-25 2019; Interpretation of progesterin and estrogen measurements in cyclic and pregnant mares.

# Dr. Stephen Kania

## PUBLICATIONS

Dehghanpir, Shannon; Bemis, David; **Kania, Stephen**; Sakaguchi, Kanako; Langohr, Ingeborg; Gaunt, Stephen; Grooters, Amy; Pucheu-Haston, Cherie "What is Your Diagnosis? Dermal Nodules in a Dog". *Veterinary Clinical Pathology* 2019;1-3. DOI: 10.1111/vcp.12723n.

Tina Richey, James S. Foster, Angela D. Williams, Anna Bryn Williams, Alexa Stroh, Sallie Macy, Craig D. Wooliver, R. Eric Heide, Karthik Varanasi, Elizabeth N. Ergen, Dianne Trent, **Stephen A. Kania**, Stephen J. Kennel, Emily B. Martin and Jonathan S. Wall. Macrophage-mediated phagocytosis and dissolution of amyloid-like fibrils in mice, monitored by optical imaging. *The American Journal of Pathology*. Feb 6. pii: S0002- 9440(18)31094-0. doi: 10.1016/j.ajpath.2019.01.011.

- Reed Magleby, David A. Bemis, David Kim, Karen C. Carroll, Mariana Castanheira, **Stephen A. Kania**, Stephen G. Jenkins, Lars F. Westblade. First Reported Human Isolation of *Staphylococcus delphini*. *Diagn Microbiol Infect Dis* 2019 Jan 26. pii: S0732-8893(18)30400-0. doi: 10.1016/j.diagmicrobio.2019.01.014.
- Mohamed A. Abouelkhair, David A. Bemis, Richard J. Giannone, Linda A. Frank, **Stephen A. Kania**. Identification, cloning and characterization of SpEX exotoxin produced by *Staphylococcus pseudintermedius*. 2019 Jul 29;14(7):e0220301. doi: 10.1371/journal.pone.0220301.
- M. E. Gilmour, J. L. Lavers, C. Lamborg, O. Chastel, **S. A. Kania**, S. A. Shaffer. 2019. Mercury as an indicator of foraging ecology but not the breeding hormone prolactin in seabirds. *Ecological Indicators* Volume 103, August 2019, Pages 248-259.
- Alaa H. Sewid, M. Nabil Hassan, A. M. Ammar, David A. Bemis, **Stephen A. Kania**. 2019. *Staphylococcus pseudintermedius* SBI paralogs bind IgM, IgG Fc and Fab and inhibit complement. *PlosOne* 2019 Jul 23;14(7):e0219817. doi: 10.1371/journal.pone.0219817.
- Manasi Balachandran, Richard J. Giannone, Mohamed Abouelkhair, David A. Bemis and **Stephen A. Kania**. Mass Spectrometric Analysis of Whole Secretome and Surface-Associated Proteins from *Staphylococcus pseudintermedius* reveals vaccine candidates. (Submitted to *Scientific Reports*).
- Michael McEntire, Edward C. Ramsay, **Stephen Kania**, Peter Prestia, Eman Anis, Andrew Cushing, and Rebecca P. Wilkes. Tiger (*panthera tigris*) and domestic cat (*felis catus*) immune responses to canarypox-vectored canine distemper vaccination. (Accepted and in press).
- Nicola T Raizner, Natalie K Gedon, **Stephen A Kania**, Harald F Kuehnle, Christoph Kuehnle, Ralf Mueller. Investigations on equine pastern dermatitis. *The Veterinary Journal* (Submitted).
- Raizner, Nicola; Gedon, Natalie; **Kania, Stephen**; Kuehnle, Harald; Kuehnle, Christoph; Mueller, Ralf. Effect of an essential fatty acid spot-on on the prevention and treatment of equine pastern dermatitis. *Veterinary Dermatology*. (Submitted).
- Brittany A. Coppinger, **Stephen Kania**, Jeffrey R. Lucas, Kathryn E. Sieving, Todd M. Freeberg. Experimental manipulation of mixed-species flocks reveals heterospecific audience effects on calling. (Submitted to *Behavior*).
- Brittany A. Coppinger, **Stephen Kania**, Jeffrey R. Lucas, Kathryn E. Seiving, Todd M. Freeberg. Risk-associated Audience Effects in Chickadees and Titmice in Heterospecific Flocks. (In preparation).
- Mohamed A. Abouelkhair, Matthew J. Keller, Hector F. Castro, Shawn R. Campagna, David A. Bemis, **Stephen A. Kania**. Comparative Metabolomics Analysis of Human and Canine *Staphylococcus schleiferi* isolates (in preparation).
- Vincent Perreten, **Stephen A. Kania** and David Bemis. *Staphylococcus ursi* sp. nov., a new member of the 'Staphylococcus intermedius Group' isolated from healthy black bears.

## PRESENTATIONS

- A Bianca Pfisterer, Cheryl Greenacre, Mohamed Abouelkhair, **Stephen Kania**, Mee-Ja Sula novel bursal virus, visceral gout, and cerebral vascular urate deposition in a double-crested cormorant, *phalacrocorax auritus*. College of Veterinary Pathologists annual meeting, San Antonio TX, November 10 – 13, 2019.
- Dane Rahoi, Robert Donnell, **Stephen Kania**, Bilateral renal cysts resembling polycystic kidney disease in an adult guinea pig. College of Veterinary Pathologists annual meeting, San Antonio TX, November 10 – 13, 2019.
- Risk-Associated Audience Effects in Heterospecific Flocks of Chickadees and Titmice Brittany A. Coppinger, **Stephen A. Kania**, Jeffrey R. Lucas, Kathryn E. Sieving, Todd M. Freeberg. *Behavior*, Chicago, IL. July 23-27, 2019.

## HONORS

- 2019 Zoetis Award for Veterinary Research Excellence. University of Tennessee College of Veterinary Medicine, September 24, 2019.

# Dr. Stephanie Kleine

## PUBLICATIONS

- Kleine SA**, Sanderson SL, George C, Roth I, Gogal RM, Thaliath M, Budsberg SC. Correlation of synovial fluid leptin with body condition scores in the healthy and osteoarthritic canine stifle. *Vet Surg* 2019; 48(5): 780-785.
- Mayer J, Williams R, **Kleine S**, He B, Meichner T, Gogal R. Immunomodulatory effects of dietary IMUNO-2865 in mice, pre- and post-vaccine challenge with parainfluenza virus 5. *Int Immunopharmacol* 2019; 8 pages.
- Budsberg SC, **Kleine SA**, Norton MM, Sandberg GS. Comparison of two inhibitors of E-type prostanoid receptor four and carprofen in dogs with experimentally induced acute synovitis. *Am J Vet Res* 2019; 80(11): 1001-1006.
- Kleine SA**, Gogal RM, George C, Thaliath MT, Budsberg SC. Elevated synovial fluid concentration of monocyte chemoattractant protein-1 and interleukin-8 in dogs with osteoarthritis of the stifle. *Vet Comp Orthop Traumatol*. 2019; 4 pages.

## PRESENTATIONS

- Klein, Stephanie**. Correlation of synovial fluid leptin with body condition scores in the healthy and osteoarthritic canine stifle. Presented at: Orthopedic Research Society Conference; Feb 2-5, 2019; Austin, TX.

# Dr. Andrea Lear

## PRESENTATIONS

- Lear AS**, Pohler KG, Caldwell M (2019). "Determination of Zika virus pathogenesis in a pregnant sheep model." ACVIM Forum. Phoenix AZ.
- Lear AS** (2019) "Placental immunity and fetal infections." Invited Speaker. Applied Reproductive Strategies in Beef Cattle. Knoxville TN (1 hr).
- Lear AS** (2019) "Practical Fluid therapy," "Biomarkers for Reproductive Success," and "Internal Medicine in Ambulatory Practice." Invited Speaker. AVMA Convention, Washington DC (3 hr).
- Lear AS** (2019) "Milk Quality Assessment in Small Ruminants" and "Abortion Investigation in the Small Ruminant Herd." Invited Speaker.
- Lear AS** (2019) "Managing the peri-parturient small ruminant." Presenter. UT Henton Conference. Knoxville, TN. (30 mins). Invited speaker. Feeding Cattle, Camodian Cattle Producer Workshop, University of Cambodia, Battambang Cambodia (5 hr, 2019).
- Invited speaker, Coley Veterinary Services Client Appreciation Dinner/Jefferson Co. Cattleman's Association Meeting. "Preventing Fetal Infections" (30 mins, 2019).
- Wright M, Needleman A, Schaffer J, Videla R, **Lear AS** (2019). "Clinical trial to determine efficacy of copper oxide wire particle administration to decrease gastrointestinal nematode concentrations in adult alpacas." Conference of Research Workers in Animal Diseases. Chicago IL. \*Winner of Best Student Presentation, awarded by Veterinary Parasitologists\*.
- Needleman A, Wright M, Schaffer J, Videla R, **Lear AS** (2019). "Safety of copper oxide wire particles administration to control gastrointestinal nematodes in adult alpacas." Conference of Research Workers in Animal Diseases. Chicago IL.
- Lear AS**, Pohler KG, Caldwell M (2019). "Determination of Zika virus pathogenesis in a pregnant sheep model." ACVIM Forum. Phoenix AZ.
- LaFlamme M, **Lear AS** (2019). "Uncommon presentation of Johne's Disease in a yearling beef heifer." AABP Annual Conference, Student Abstract Competition. St. Louis MO. \*Winner of Student Case Presentation\*.
- Lee A, Graves M, Turner A, **Lear AS**, Cox S, Caldwell M, and Krawczel P (2019). "Effects of Transdermal Flunixin Meglumine Following Castration on Goats' Behavior." UTIA Graduate Research Symposium. Knoxville TN.

## HONORS

- 2019 Zoetis Distinguished Veterinary Teacher Award. University of Tennessee College of Veterinary Medicine, July 30, 2019.
- 2019 Large Animal Clinician of the Year. University of Tennessee College of Veterinary Medicine, May 10, 2019.
- 2019 Charles and Julie K. Wharton Faculty Development Award.

# Dr. Denae LoBato

## PUBLICATIONS

- Andrea E. Pohly, Michael F. Rosser, and **Denae N. LoBato**. 2019. A Puzzling Papilloma: Cytological vs. Histological Evaluation of a Canine Viral Papilloma. *Epitome Quarterly*, Fall issue. A magazine of the Illinois State Veterinary Medical Association.
- Sarah J. Baker, Ellen Haynes, Megan Gramhofer, Krsitin Stanford, Michelle Christman, Robert J. Ossiboff, **Denae N. LoBato**, and Matthew C. Allender. 2019. Case Definition and Diagnostic Testing for Snake Fungal Disease. *Herpetological Review* 50 (2): 279-285.
- Sarah Gray, Santiago Gutierrez-Nibeyro, and **Denae LoBato**. Tenoscopic Removal of a Protruding Osteophyte as a Treatment for Chronic Common Digital Extensor Tendinopathy and Associated Tenosynovitis. *Equine Veterinary Education*. Accepted Jan, 2019.

## PRESENTATIONS

- Translating the Liberal Arts to a Career in Science. Pathology, Research, and Teaching: A Romance. Invited talk given to the undergraduate students at Hollins University, Roanoke, VA. March 2019.
- Pohly, AE, E Haynes, MC Allender, and **DN LoBato**. Pathological Characterization of Natural *Ophidiomyces ophiodiicola* Infection in Wild-Caught Terrestrial and Aquatic Snakes: A Standardized Approach to Determine the Effect of Lesion Distribution, Ecosystem, and Comorbidities on Disease. Annual Meeting of the American College of Veterinary Pathologists. San Antonio, TX. November, 2019.

# Dr. Chika Okafor

## PUBLICATIONS

- Okafor, C.C.**, Collins S.L., Daniel J.A., Coetzee J.F. and Whitlock, B.K. (2019). Seroprevalence of bovine anaplasmosis in Georgia. *Vet. Parasitol. Regnl. Stud. Rep.* (<https://doi.org/10.1016/j.vprsr.2018.100258>).
- Ekakoro, J.E., Caldwell, M., Strand, E. B., and **Okafor, C.C.**<sup>†</sup> (2019). Drivers, alternatives, knowledge, and perceptions towards antimicrobial use among Tennessee beef cattle producers: A qualitative study. *BMC Vet Res*, 15:16. (<https://doi.org/10.1186/s12917-018-1731-6>).
- Okafor, C.C.**, Collins S.L., Daniel J.A., Coetzee J.F. and Whitlock, B.K. (2019). Factors associated with seroprevalence of bovine anaplasmosis in Mississippi, USA. *Vet. Parasitol. Regnl. Stud. Rep.* (<https://doi.org/10.1016/j.vprsr.2019.100301>).
- Ekakoro, J.E., Caldwell, M., Strand, E. B., and **Okafor, C.C.**<sup>†</sup> (2019). Perceptions of Tennessee cattle producers regarding the Veterinary Feed Directive. *Plos One* (<https://doi.org/10.1371/journal.pone.0217773>).
- Nystrom, M., Odunayo, A., and **Okafor, C.C.**<sup>\*</sup> (2019). Assessment of hydromorphone and dexmedetomidine for emesis induction in cats. *J Vet Emergency and Critical Care* (<https://doi.org/10.1111/vec.12866>).
- Ekakoro, J.E., Caldwell, M., Strand, E. B., Strickland, L. and **Okafor, C.C.**<sup>†</sup> (2019). A survey of antimicrobial use practices of Tennessee beef producers. *BMC Vet Res*, 15:222. (<https://doi.org/10.1186/s12917-019-1978-6>).

## PRESENTATIONS

- Conkey, N. P, **Okafor, C.C.**<sup>\*</sup>, Strickland, L., and Whitlock, B.K. (2019). Factors associated with bulls not classified as satisfactory potential breeders at University of Tennessee Veterinary Medical Center. Society for Theriogenology, Savannah, Georgia, July 24-27. (Oral presentation).
- Okafor, C.C.**, Collins S.L., Daniel J.A., Coetzee J.F. and Whitlock, B.K. (2019). Seroprevalence of *Anaplasma marginale* in Georgia cattle. Conference of Research Workers in Animal Diseases, Chicago, Illinois, Nov 2-5. (Oral presentation).
- Okafor, C.C.**, Collins S.L., Daniel J.A., Harvey B., Coetzee J.F. and Whitlock, B.K (2019). Factors associated with seroprevalence of *Anaplasma marginale* in Mississippi cattle. Conference of Research Workers in Animal Diseases, Chicago, Illinois, Nov 2-5. (Poster presentation).
- Okafor, C.C.**, Ekakoro, J.E., Caldwell, M., and Strand, E. B. (2019). Psychosocial factors of Tennessee cattle producers regarding responsible antibiotic use. Conference of Research Workers in Animal Diseases, Chicago, Illinois, Nov 2-5. (Oral presentation).
- Enem, S. I, Oboegbulem, S.I and **Okafor, C.C.**<sup>\*</sup> (2019). Prevalence of Shigatoxin producing *Escherichia coli* O157 in cattle, chicken and animal products in Abuja, Nigeria. Conference of Research Workers in Animal Diseases, Chicago, Illinois, Nov 2-5. (Oral presentation).
- Enem, S. I, **Okafor, C.C.**<sup>\*</sup>, Kia, G.C.N, and Okolocha, E.C. (2019). Impact of abattoir wastewater on the physicochemical parameters and heavy metal concentration of water bodies in Abuja, Nigeria. Conference of Research Workers in Animal Diseases, Chicago, Illinois, Nov 2-5. (Oral presentation).
- Akter, A., Eckelkamp, L., **Okafor, C.C.**<sup>\*</sup>, Pighetti, G., Caldwell, P., Myer, P., and Schneider, L. (2019). Differentiation of the nasopharyngeal microbiomes in stocker calves experiencing BRD-associated activity change. 4th Annual UTIA Graduate Research Poster Symposium and Competition, UTIA Knoxville, December 17. (Poster presentation).
- Whitlock, B.K., Collins S.L., Daniel J.A., Coetzee J.F. and **Okafor, C.C.**<sup>†</sup> (2019). Prevalence of bovine anaplasmosis in the U.S. 2nd Annual Bovine Anaplasmosis Symposium, Manhattan, Kansas, May 20.
- Okafor, C.C.** (2019). Antibiotic use in food animals and deceptive labelling practices. An invited lecture by Jiah Toms to the employees of UT Institute of Public Services at 1610 University Ave, Knoxville, TN 37921 on September 18. (In addition to employees in attendance, others zoomed from across the state).
- Okafor, C.C.** (2019). Antibiotic use in food animals and effects on One Health. An invited lecture by the Department Head/Director of Public Health at UT, Dr. Kathy Brown, to the graduate students in the Public Health Program at the UT Health and Physical Education and Recreation Building on January 24. (A total of 30 students attended).
- Caldwell, M, Ekakoro, J.E., Strand, E. B., and **Okafor, C.C.**<sup>†</sup> (2019). Antibiotic use by Tennessee producers. 4th Annual UTIA Graduate Research Poster Symposium and Competition, UTIA Knoxville, December 17.
- AAVMC workshop of instructors teaching Antimicrobial Resistance topics to veterinary students with the objective of improving subject contents and delivery] Workshop at AAVMC headquarters in Washington, DC 20005 on June 13, 2019.
- [Kansas State University-sponsored invitation to the K-State annual symposium on Anaplasmosis due to my numerous works on the disease. In the symposium, we explored areas on inter-institutional collaborations] Symposium at Hilton Garden Inn Manhattan KS, May 20, 2019.
- [An American Association of Veterinary Medical Colleges (AAVMC) and Association of Public and Land-grant Universities (APLU) summit on Gene Editing in Livestock: Looking to the Future for academic researchers actively working in the area of gene editing of livestock to describe the current state of the science and consider ways to provide science-based evidence that will impact public policy development, including perspectives on safety considerations for human consumption and the impact that applying such technology will have on the future of food security] Summit at AAVMC headquarters in Washington, DC 20005 September 24-25, 2019.

# Dr. Barry Rouse

## PUBLICATIONS

- Naveen K. Rajasagi, **Barry T. Rouse**. 2019. The Role of T Cells in Herpes Stromal Keratitis. *Front Immunol.* 2019; 10: 512. (<https://doi.org/10.3389/fimmu.2019.00512>).
- Deepak Sumbria, Engin Berber, **Barry T. Rouse**. 2019. Factors Affecting the Tissue Damaging Consequences of Viral Infections. *Front Microbiol.* 2019; 10: 2314. (<https://doi.org/10.3389/fmicb.2019.02314>).

## PRESENTATIONS

- Invited Seminar. Georgia State University. 16 April 2019.
- Invited Seminar. Emory University. Atlanta, Georgia. 28 February 2019.
- Plenary speaker. 20th Conference on Molecular biology in diagnostics and biotechnology. Warsaw, Poland. 23 Nov 2019.
- Advisory board meeting. Beykoz Life Sciences & Biotechnology Institute. Istanbul, Turkey. Dec 5-8 2019.
- Invited Speaker. International Microbiology Meeting. Chennai, India. 9-12 Dec 2019.
- Invited Seminar. Sir Ranchandran Medical College and Research Institute. Chennai, India. 13 Dec 2019.

# Dr. Leisel Schneider

## PUBLICATIONS

- Clemmons, B. A., C. Martino, **L. Schneider**, M. M. Embree, and P. Myer. 2019. Temporal Stability of the Ruminal Bacterial Community in Beef Steers. *Scientific Reports*, 9:9522.
- Gregg, B. A., P. A. Parker, K. M. Waller, **L. Schneider**, M. Garcia, B. Bradford, J. A. Daniel, and B. Whitlock. 2019. Effects of central and peripheral administration of an acute phase protein,  $\alpha$ -1-acid-glycoprotein, on feed intake and rectal temperature in sheep. *Journal of Animal Science*.
- Loftin, C. M., U. B. Donnett, **L. Schneider**, and A. S. Varela-Stokes. 2019. Prevalence of endoparasites in northern Mississippi shelter cats. *Veterinary Parasitology*.
- Melchior, E.A., J. K. Smith, **L. Schneider**, J. T. Mulliniks, G. E. Bates, M. D. Flythe, J. L. Klotz, J. Huihua, J. P. Goodman, A. R. Lee, J. M. Caldwell, and P. Myer. 2019. Effects of endophyte-infected tall fescue seed and red clover isoflavones on rumen microbial populations and physiological parameters of beef cattle. *Translational Animal Science*, 3:316–328.
- Myer, P., B. A. Clemmons, **L. Schneider**, and T. B. Ault. 2019. Microbiomes in Ruminant Protein Production and Food Security. *CAB Reviews: Perspectives in Agriculture, Veterinary Science, Nutrition and Natural Resources*.
- Peel, S. A., T. A. Thorsen, **L. Schneider**, and J. T. Weinhandl. 2019. Effects of Foot Rotation on ACL Injury Risk Variables During Drop Landing. *Journal of Science in Sport and Exercise*.
- Singh, S., X. Yin, H. J. Savoy, **L. Schneider**, and S. Jagadamma. 2019. Phosphorus and Potassium Fertilizer Rate Verification for Corn-Wheat-Soybean Rotation System in Tennessee. *Agronomy Journal*, 111:1-9.
- Solo, K., S. B. Collins, **L. Schneider**, M. R. Hajimorad, F. A. Hale, J. B. Wilkerson, A. S. Windham, and M. T. Windham. 2019. Evaluation of Floral Cuts on Eriophyid Mite Retention on Knock Out and Multiflora Rose Cuttings. *Plant Health Progress*, 20:83-87.
- Solo, K., S. B. Collins, **L. Schneider**, M. R. Hajimorad, F. A. Hale, J. B. Wilkerson, A. S. Windham, D. Byrne, and M. T. Windham. 2019. Evaluation of Rosa species accessions for resistance to eriophyid mites. *Journal of Environmental Horticulture*, 37(4):108-112.

## PRESENTATIONS

*Published Abstracts (\* indicates presenting author, † indicates student under supervision of Schneider)*

- Akter, A.\*†, E. Eckelkamp, J. L. Edwards, C. C. Okafor, G. M. Pighetti, J. M. Caldwell, P. Myer, and **L. Schneider**. 2019. Differentiation of the nasopharyngeal microbiomes in stocker calves experiencing BRD-associated activity change. *UTIA Graduate Research and Poster Symposium, UTBFC Annual Research and Recommendation Meeting, Knoxville, TN.*
- Ault, T. B.\*†, B. A. Clemmons, S. T. Reese, F. G. Dantas, **L. Schneider**, T. P. L. Smith, J. L. Edwards, and P. Myer. 2019. Bacterial communities of the uterus and vagina between resulting pregnant and non-pregnant postpartum beef cows. *Journal of Animal Science*, 97(Supplement 2)49. *ASAS Midwest Annual Meeting, Omaha, NE.*
- Ault, T.\*†, B. Clemmons, S. Reese, G. A. Franco, F. G. Dantas, **L. Schneider**, T. P. L. Smith, J. L. Edwards, P. Myer, and K. G. Pohler. 2019. 87 Bacterial communities of the uterus and vagina between resulting pregnant and non-pregnant postpartum beef cows. *Journal of Animal Science*.
- Benton, S.\*†, L. Petr, **L. Schneider**, and J. L. Ivey. 2019. Effects of therapeutic riding on parental perceptions of mental and physical disability improvement. *Journal of Equine Veterinary Science*, 76:115.
- Brandt, K. J.\*†, T. B. Ault, P. Myer, **L. Schneider**, and K. McLean. 2019. Replacement heifers supplemented with varying levels of protein from weaning until first breeding had altered uterine environment characteristics. *Applied Reproductive Strategies in Beef Cattle Meeting, Knoxville, TN.*

- Brandt, K. J.\*, T. B. Ault, P. Myer, **L. Schneider**, and K. McLean. 2019. The effect of supplemental protein from weaning until first breeding on heifer development and uterine environment characteristics ASAS-CSAS Annual Meeting and Trade Show, Austin, TX. 97(Supplement 3)140.
- Brandt, K. J.\*, T. B. Seay, P. Myer, **L. Schneider**, and K. McLean. 2019. Supplemental proteins impact on uterine environment characteristics in developing beef heifers from weaning through breeding. UTIA Graduate Research and Poster Symposium, UTBFC Annual Research and Recommendation Meeting, Knoxville, TN.
- Campeaux, A. D., A. R. Lee\*, M. C. Cantor, J. H. C. Costa, **L. Schneider**, and P. D. Krawczel. 2019. Effects of Housing Dams and Calves Together on Behavior, Growth, and Production. International Society of Applied Ethology.
- Clemmons, B. A.\*, C. Martino, **L. Schneider**, M. M. Embree, and P. Myer. 2019. Temporal stability of the ruminal bacterial communities in beef steers. Congress on Gastrointestinal Function, Chicago, IL.
- Clemmons, B. A.\*, M. A. Campbell, R. J. Grant, H. M. Dann, P. D. Krawczel, **L. Schneider**, and P. Myer. 2019. Effect of stocking density on ruminal bacterial communities of Holstein dairy cows. ASM Microbe Annual Meeting, San Francisco, CA.
- Cunicelli, M.J.\*, C. E. Sams, **L. Schneider**, D. R. West, and V. R. Pantalone. 2019. Mapping and identification of QTL associated with soybean seed yield, protein, oil, and amino acids in 560IT × U99- 310255 RIL population using SNP genotyping. Crop Science Society of America.
- Hall, S. M.\*, T. M. Prado, **L. Schneider**, J. L. Klabnik-Bradford, W. T. Riddle, W. Friend, and M. R. Schnobrich. 2019. Influence of time between breeding and ovulation on foal sex ratio. Theriogenology Annual Meeting.
- Harrison, T. D.\*, K. J. Brandt, R. R. Payton, **L. Schneider**, P. Myer, J. Rhinehart, L. A. Rispoli, J. L. Edwards, and K. McLean. 2019. The effects of protein supplementation on concentrations of angiogenic cytokines and miscellaneous chemokines during heifer development. UTIA Graduate Research and Poster Symposium, UTBFC Annual Research and Recommendation Meeting, Knoxville, TN.
- Henniger, M. T.\*, K. E. Hales, J. E. Wells, H. C. Freetly, **L. Schneider**, K. McLean, B. A. Clemmons, and P. Myer. 2019. Effects of a moderate and aggressive implant strategy on the ruminal microbial communities and metabolome in steers. UTIA Graduate Research and Poster Symposium, UTBFC Annual Research and Recommendation Meeting, Knoxville, TN.
- Hughes, V.\*, M. Hines, A. Cox, **L. Schneider**, and J. L. Ivey. 2019. Retrospective analysis of clinical health markers as indicators of death in malnourished equids. Journal of Equine Veterinary Science.
- Lee, A.\*, P. D. Krawczel, E. Ternman, **L. Schneider**, P. Lovendahl, and L. Munksgaard. 2019. Evaluating the effects of mean occupation rate and milk production on two automatic milking systems. International Society of Applied Ethology.
- Lee, A.\*, P. D. Krawczel, E. Ternman, **L. Schneider**, P. Lovendahl, and L. Munksgaard. 2019. Evaluating the effects of mean stocking density on automatic milking system use and total milk production in Holstein cows. Precision Dairy Farming Technology Proceedings, Rochester, MN.
- Lee, A.\*, P. D. Krawczel, E. Ternman, **L. Schneider**, P. Lovendahl, and L. Munksgaard. 2019. Mean occupation rate's effects on hourly automatic milking system use and total milk production in Holstein cows. American Dairy Science Association, Cincinnati, OH.
- Lee, A.\*, P. D. Krawczel, E. Ternman, **L. Schneider**, P. Lovendahl, and L. Munksgaard. 2019. Evaluating the effects of stocking density on Holstein cows' milk production using automatic milking systems. Women in STEM, Knoxville, TN.
- Luc, E. K. \*, **L. Schneider**, V. L. Couture, H. R. Bailey, P. D. Krawczel, S. R. Smith, A. Rius, and G. M. Pighetti. 2019. The probability of subclinical mastitis and isolated organisms in organic dairy herds varies between years. American Dairy Science Association.
- Melvin, K. \*, **L. Schneider**, P. D. Krawczel, and J. L. Ivey. 2019. Public perceptions of equine processing and welfare. Journal of Animal Science, ASAS Southern Section, Chattanooga, TN. Jan 2020.
- Melvin, K. \*, S. Wallace\*, **L. Schneider**, P. D. Krawczel, and J. L. Ivey. 2019. Public perceptions of equine welfare classification and subsequent use. Journal of Equine Veterinary Science.
- Proctor, J. A. \*, N. S. Long, C. K. Biehler, **L. Schneider**, J. Rhinehart, and J. K. Smith. 2019. 204 Relationships between semen quality and scrotal circumference, adiposity, and rumen conditions of developing bulls. Journal of Animal Science.
- Proctor, J. A. \*, N. S. Long, C. K. Biehler, **L. Schneider**, J. Rhinehart, L. G. Strickland, and J. K. Smith. 2019. 191 Effects of feeding strategy on growth performance and semen quality of developing bulls. Journal of Animal Science.
- Rifkin, R. \*, R. Grześkowiak, A. Bow, B. Jackson, K. Algahazali, S. Bourdo, A. Biris, **L. Schneider**, H. S. Adair, III, P. Mulon, R. Seddighi, T. J. Doherty, S. Hecht, M. Dhar, D. P. Harper, S. Hecht, and D. E. Anderson. 2019. Long-Term Osseointegration Assessment of a Synthetic Bone Graft Scaffold Using a Goat Segmental Defect Model. Veterinary Surgery.

## Dr. Hwa-Chain Robert Wang

### PUBLICATIONS

- Fararjeh AS, Tu SH, Chen LC, Cheng TC, Liu YR, Chang HL, Chang HW, Huang CC, **Wang HR**, Hwang-Verslues WW, Wu CH, Ho YS. Long-term exposure to extremely low-dose of nicotine and 4-(methylnitrosamino)-1-(3-pyridyl)-1-butanone (NNK) induce non-malignant breast epithelial cell transformation through activation of the  $\alpha 9$ -nicotinic acetylcholine receptor-mediated signaling pathway. *Environ Toxicol.* 34(1):73-82, 2019. PMID: 30259641.
- Meng W, Wang XJ\*, **Wang HR\*\***. Targeting nuclear proteins for control of viral replication. *Crit Rev Microbiol.* 21:1-19, 2019. PMID: 30663919.
- Cui-Cui Li, Xiao-Jia Wang\*, **Hwa-Chain Robert Wang\*\***. Repurposing of host-based therapeutics to control coronavirus and influenza virus. *Drug Discovery Today* 24:726-736, 2019. PMID: 30711575 PMCID: PMC7108273.

## PRESENTATIONS

- Hwa-Chain Robert Wang\*\***, Pawat Pattarawat, Jinquan Wang, Robert Donnell. Targeting vulnerable aberrant cancer-associated pathways by rationalized triple combination regimens to effectively control urothelial carcinoma cells in vitro and in vivo. The 2019 Proceedings of the American Association for Cancer Research, Abstract 1222, 4/2019 (International).
- Pawat Pattarawat, Shelby Wallace, Agricola Odoi, Bianca Pfisterer, **Hwa-Chain Robert Wang\*\***. Formulation of tolerable protocols for combination regimens to control triple-negative breast cancer cell-derived xenograft tumor development in animals. The 2019 Proceedings of the American Association for Cancer Research, Abstract 1230, 4/2019. (International).
- Hwa-Chain Robert Wang\*\***, Pawat Pattarawat, Shelby Wallace, Robert Donnell. Targeting aberrant pathways by an advanced combination regimen to effectively and safely control urothelial carcinoma. The Proceedings of the 2019 AACR-NCI-EORTC Molecular Targets and Cancer Therapeutics Conference, Abstract C038. 10/2019 (International).
- Pawat Pattarawat, Shelby Wallace, Agricola Odoi, Bianca Pfisterer, **Hwa-Chain Robert Wang\*\***. Formulation of tolerable protocols for combination regimens to control triple-negative breast cancer cell-derived xenograft tumor development in animals. 2019 Annual AACR Meeting, Atlanta, GA, 3/31/2019 (International).
- Hwa-Chain Robert Wang\*\***, Pawat Pattarawat, Jinquan Wang, Robert Donnell. Targeting vulnerable aberrant cancer-associated pathways by rationalized triple combination regimens to effectively control urothelial carcinoma cells in vitro and in vivo. 2019 Annual AACR Meeting, Atlanta, GA, 4/1/2019 (International).
- Hwa-Chain Robert Wang\*\***, Pawat Pattarawat, Shelby Wallace, Robert Donnell. Targeting aberrant pathways by an advanced combination regimen to effectively and safely control urothelial carcinoma. The 2019 AACR-NCI-EORTC Molecular Targets and Cancer Therapeutics Conference, Boston, Massachusetts, 10/29/2019 (International).
- Hwa-Chain R. Wang**. Invited Speaker: Rationalized development of therapeutic regimens for urinary bladder cancers. Oak Ridge National Laboratory, Oak Ridge, TN, 11/11/2019.
- Hwa-Chain R. Wang**. Invited Speaker: Writing a Scientific Manuscript; fully sponsored by Guangdong Ocean University, China; 12/11/2019.
- Hwa-Chain R. Wang**. Invited Speaker: Signal Transduction and molecular Oncology, sponsored by Sichuan Agricultural University, China; 12/13/2019.
- Hwa-Chain R. Wang**. Invited Speaker: Writing a Scientific Manuscript; sponsored by Sichuan Agricultural University, China; 12/13/2019.
- Hwa-Chain R. Wang**. Invited Speaker: US Graduate Training, Veterinary Education, Professional Objectives; fully sponsored by Guangdong Ocean University, China; 12/18/2019.





# Research Funded Externally

Lead Investigator	Proposal Title	Sponsor	Amount Awarded
Dr. David Anderson	CAREER: Muscle-Driven Endoprostheses for Restoring Natural Sensorimotor Function	US - NSF - National Science Foundation	\$25,935.00
	Advanced Development and Validation of a Nanomaterial-Based Scaffold for Simultaneous Bone Regeneration and Antimicrobial Drug Delivery	Department of Defense, Army PRORP sub-award from University of Arkansas	\$249,496.00
	Advanced Development and Testing of a Nanomaterial-Based Scaffold for Bone Regeneration and Drug Delivery	Department of Defense, Army JMRP sub-award from University of Arkansas	\$2,666,465.00
Dr. Stephen Kania	Evaluation of a Therapeutic Vaccine for the treatment of Methicillin Resistant <i>Staphylococcus</i> Pyoderma in Dogs	Boehringer Ingelheim Animal Health USA Inc.	\$42,000.00
	2020 Boehringer Ingelheim Veterinary Scholars Program (BIVSP)	Boehringer Ingelheim Animal Health USA Inc.	\$15,876.00
Dr. Barry Rouse	Impact of metabolic regulation on viral neurovirulence	HHS - NIH - National Institutes of Health	\$183,750.00
	Mechanisms of Herpetic Keratitis	HHS - NIH - NEI - National Eye Institute	\$44,872.00
	Mechanisms of Herpetic Keratitis	HHS - NIH - NEI - National Eye Institute	\$403,838.00
<b>TOTAL</b>			<b>\$3,632,232.00</b>

# Research Funded Internally

Lead Investigator	Proposal Title	Amount Awarded
Dr. David Anderson	Determination of the mechanisms associated with <i>Staphylococcus aureus</i> isolated from cases of hypertrophic osteomyelitis	\$20,500
Dr. Marc Caldwell	Effect of ethyl pyruvate on the inflammatory response and neutrophil function in neonatal calves	\$29,995
Dr. Vermont Punongba Dia	Management of colitis by lunasin-enriched material in mouse model	\$26,780
Dr. Stephen Kania	Chimeric Attenuated Virulence Factor Vaccine for <i>Staphylococcus pseudintermedius</i> Canine Pyoderma	\$15,000
Dr. Andrea Lear	Viral Trojan Horse: Does exosome formation mediate BVDV transmission to susceptible cells?	\$15,000
Dr. Chika Okafor	Prevalence of antibiotic residues in selected foods of animal origin at farmers' markets in East Tennessee	\$30,000
Dr. Leisel Schneider	Implementation of a novel biosensor for early respiratory disease detection in beef stocker cattle	\$30,000
Dr. Hwa-Chain Robert Wang	A metastatic tumor animal model for anticancer therapeutics	\$30,000
<b>TOTAL</b>		<b>\$197,275</b>



2019 Regenerative and Rehabilitation Medicine team. Back row, left to right: Austin Bow, Steven Newby, David Anderson, Steve Adair. Middle row left to right: Monica Rawson, Remi Grześkowiak, Rebecca Rifkin, Tena Ursini. Bottom row left to right: Madhu Dhar, Elizabeth Croy, Richard Steiner.

# Actual and Proposed Budget

	FY20 Actual			FY21 Proposed		
	Matching	Appropri.	Total	Matching	Appropri.	Total
<b>Expenditures</b>	<b>\$136,133</b>	<b>\$260,748</b>	<b>\$396,881</b>	<b>\$933,921</b>	<b>\$1,867,842</b>	<b>\$2,801,763</b>
<b>Salaries</b>						
Faculty	\$6,784	\$13,568	\$20,351	\$95,117	\$190,234	\$285,351
Other Professional	\$835	\$1,669	\$2,504	\$835	\$1,669	\$2,504
Clerical/ Supporting	\$23,429	\$46,858	\$70,287	\$23,429	\$46,858	\$70,287
Assistantships	\$1,517	\$3,033	\$4,550	\$0	\$0	-
<b>Total Salaries</b>	<b>\$32,565</b>	<b>\$65,128</b>	<b>\$97,692</b>	<b>\$119,381</b>	<b>\$238,761</b>	<b>\$358,142</b>
Longevity (Excluded from Salaries)	\$178	\$355	\$533	-	-	-
Fringe Benefits	\$5,622	\$11,244	\$16,866	\$23,922	\$47,844	\$71,766
<b>Total Personnel</b>	<b>\$38,365</b>	<b>\$76,727</b>	<b>\$115,091</b>	<b>\$143,303</b>	<b>\$286,605</b>	<b>\$429,908</b>
<b>Non-Personnel</b>						
Travel	\$2,391	\$4,781	\$7,172	\$2,391	\$4,781	\$7,172
Software	\$153	\$306	\$459	-	-	-
Books & Journals	-	-	-	-	-	-
Other Supplies	\$30,517	\$61,034	\$91,551	\$85,017	\$170,034	\$255,051
Equipment	\$23,611	\$47,222	\$70,833	\$377,611	\$755,222	\$1,132,833
Maintenance	\$0	\$0	-	\$0	\$0	-
Scholarships	\$7,081	\$3,541	\$10,622	-	-	-
Consultants	-	-	-	-	-	-
Renovation	-	-	-	\$166,667	\$333,333	\$500,000
<b>Other (Specify):</b>	-	-	-	-	-	-
Rentals/Entertainment	\$599	\$300	\$899	-	-	-
Printing/Publications/Postage	\$2,236	\$4,472	\$6,708	\$0	\$0	-
Professional Services/Memberships	\$5,557	\$11,113	\$16,670	\$0	\$0	-
Contract & Special Services	\$25,600	\$51,199	\$76,799	\$158,933	\$317,866	\$476,799
Gasoline & Diesel	\$26	\$51	\$77	-	-	-
<b>Total Non-Personnel</b>	<b>\$97,771</b>	<b>\$184,019</b>	<b>\$281,790</b>	<b>\$790,619</b>	<b>\$1,581,236</b>	<b>\$2,371,855</b>
<b>GRAND TOTAL</b>	<b>\$136,134</b>	<b>\$260,747</b>	<b>\$396,881</b>	<b>\$933,922</b>	<b>\$1,867,841</b>	<b>\$2,801,763</b>
<b>Revenue</b>						
New State Appropriation	-	\$524,064	\$524,064	-	\$525,079	\$525,079
Carryover State Appropriation	-	\$1,153,145	\$1,153,145	-	\$1,412,621	\$1,413,129
New Matching Funds	\$262,031	-	\$262,031	\$262,540	-	\$262,540
Carryover from Previous Year Matching Funds	\$576,573	-	\$576,573	\$706,310	-	\$706,565
<b>TOTAL REVENUE</b>	<b>\$838,604</b>	<b>\$1,677,209</b>	<b>\$2,515,813</b>	<b>\$968,850</b>	<b>\$1,937,700</b>	<b>\$2,907,313</b>

# Requested Budget

	FY22 Requested		
	Matching	Appopr.	Total
<b>Expenditures</b>	<b>\$302,558</b>	<b>\$605,116</b>	<b>\$931,787</b>
<b>Salaries</b>			
Faculty	\$99,873	\$199,746	\$299,619
Other Professional	\$876	\$1,753	\$2,629
Clerical/ Supporting	\$24,600	\$49,201	\$73,801
Assistantships	\$0	\$0	-
<b>Total Salaries</b>	<b>\$125,349</b>	<b>\$250,700</b>	<b>\$376,049</b>
Longevity (Excluded from Salaries)			
Fringe Benefits	\$25,118	\$50,236	\$75,354
<b>Total Personnel</b>	<b>\$150,467</b>	<b>\$300,936</b>	<b>\$451,403</b>
<b>Non-Personnel</b>			
Travel	\$4,781	\$9,563	\$14,344
Software	-	-	\$918
Books & Journals	-	-	-
Other Supplies	\$52,841	\$105,681	\$158,522
Equipment	\$39,130	\$78,259	\$117,389
Maintenance	\$0	\$0	-
Scholarships	-	-	\$21,244
Consultants	-	-	-
Renovation	\$0	\$0	\$0
<b>Other (Specify):</b>	-	-	-
Rentals/Entertainment	-	-	\$1,798
Printing/Publications/Postage	\$1,118	\$2,236	\$3,354
Professional Services/Memberships	\$11,113	\$22,227	\$33,340
Contract & Special Services	\$43,107	\$86,214	\$129,321
Gasoline & Diesel	-	-	\$154
<b>Total Non-Personnel</b>	<b>\$152,090</b>	<b>\$304,180</b>	<b>\$480,384</b>
<b>GRAND TOTAL</b>	<b>\$302,557</b>	<b>\$605,116</b>	<b>\$931,787</b>
<b>Revenue</b>			
New State Appropriation	-	\$551,333	\$551,333
Carryover State Appropriation	-	\$69,858	\$69,858
New Matching Funds	\$275,667	-	\$275,667
Carryover from Previous Year Matching Funds	\$34,929	-	\$34,929
<b>TOTAL REVENUE</b>	<b>\$310,596</b>	<b>\$621,191</b>	<b>\$931,787</b>



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