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Cats May Help Increase Empathy, Decrease Anxiety for Kids with Autism

As a former school nurse in the Columbia Public Schools, Gretchen Carlisle would often interact with students with disabilities who took various medications or had seizures throughout the day. At some schools, the special education teacher would bring in dogs, guinea pigs and fish as a reward for good behavior, and Carlisle noticed what a calming presence the pets seemed to be for the students with disabilities.

Now a research scientist at the MU Research Center for Human-Animal Interaction (ReCHAI) in the MU College of Veterinary Medicine, Carlisle studies the benefits that companion animals can have for families. Although there is plenty of existing research emphasizing the benefits of dogs for children with autism, Carlisle's newest study has found cats may help increase empathy while decreasing separation anxiety for children with autism. The findings can have beneficial implications for families considering adopting a companion animal for their child.

"Previous research has shown parents of kids with autism are more stressed than parents of kids with any other disability," Carlisle said. "If a family is considering adopting a companion animal, we want to provide the best evidence-based information possible so they can make an informed decision, and cats might be more beneficial than dogs to some families."

In the study, families that had children with autism aged 6-14 were recruited through the MU Thompson Center for Autism and Neurodevelopmental Disorders and monitored after adopting a cat into their home. The cats were screened for temperament to ensure they were calm and a good match for the family. Not only did the families report an instant bond between their child with autism and their new cat, but the bond remained strong over the course of time, and the child's anxiety decreased over time.

"We found the main benefit of these companion animals is their unconditional acceptance," Carlisle said. "Some children with autism may have sensory issues or be sensitive to loud noises, so a cat may be an appropriate, comforting pet for some families due to their calming presence."

Helping families make the best choice for their kids has motivated Carlisle's research with companion animals, and the study's findings highlight the benefits of human-animal interaction.

"As a former pediatric nurse, I have always strived to help children, and one thing I learned is that you need to involve the parents so they can make informed choices for their children," Carlisle said. "I see pets as a way to enhance wellness, and it feels gratifying to provide assistance to families that have a lot on their plate."

"Exploratory study of cat adoption in families of children with autism: Impact on children's social skills and anxiety" was recently published in the *Journal of Pediatric Nursing*. Funding for the study was provided by the Human Animal Bond Research Institute and the Winn Feline Foundation.

Story courtesy of Show Me Mizzou

Contact: Brian Consiglio, 573-882-9144, consigliob@missouri.edu



Gretchen Carlisle is a research scientist at the MU Research Center for Human-Animal Interaction.

Expert Comment: Pet Food Recalled After MU Researcher Finds Contamination

Following an alert by a University of Missouri veterinary toxicology expert working in cooperation with the Missouri Department of Agriculture (MDA) and the Food and Drug Administration (FDA), Midwestern Pet Foods, Inc. voluntarily recalled some of their Sportmix brand of pet food on Dec. 30, 2020. The FDA launched a formal investigation to identify all Sportmix pet food products containing potentially fatal levels of aflatoxin, a fungal toxin that can be poisonous if consumed by animals or humans. The FDA is now aware of more than 30 canine deaths and 8 illnesses in dogs, located in multiple states, that ate the contaminated product.

MU's Tim Evans, an associate professor in the MU College of Veterinary Medicine and head of the toxicology section in MU's Veterinary Medical Diagnostic Laboratory (VMDL), alerted the Missouri Department of Agriculture and Steve Strubberg, Missouri's State Veterinarian, after a sample of pet food submitted to the VMDL by one of his former students, David Sikes, was found to contain high, potentially fatal levels of aflatoxin that exceeded FDA regulations.

The FDA's deputy director for the Division of Compliance at the Center for Veterinary Medicine, Amber McCoig, is another former student of Evans, and she has been actively involved in the investigation since its very beginning.

"Although this pet food recall is still unfolding, we are sharing the facts we have so far because the levels of aflatoxin found in the recalled pet food are potentially fatal," said McCoig, who graduated from MU in 2005. "We are working quickly on this developing situation and will continue to update the public as new information becomes available. This is in service of FDA's mission to protect human and animal health."

[FDA Alert: Certain Lots of Sportmix Pet Food Recalled for Potentially Fatal Levels of Aflatoxin](https://cvm.missouri.edu/fda-alert-certain-lots-of-sportmix-pet-food-recalled-for-potentially-fatal-levels-of-aflatoxin/)

Link: <https://cvm.missouri.edu/fda-alert-certain-lots-of-sportmix-pet-food-recalled-for-potentially-fatal-levels-of-aflatoxin/>

Evans provides an overview of what happened and advice for what pet owners should look out for and what to do if they suspect their pet may have eaten contaminated pet food:

How did the Sportmix pet food become contaminated?

While the FDA is still investigating, we know that aflatoxin can be produced by mold in grains, especially drought-stressed corn, and high levels of the toxin can be extremely poisonous to pets. Corn is a major ingredient in some of Midwestern Pet Food's Sportsmix products.

How did you first find out the pet food was potentially contaminated?

When I heard from a former student practicing in the southern part of Missouri about some dogs showing clinical signs resembling aflatoxicosis, I asked him to send a deceased dog for a postmortem examination and a sample of the dog's food to be tested for aflatoxins at MU's Veterinary Medical Diagnostic Laboratory (VMDL). One of the VMDL's pathologists, Gayle Johnson, found changes consistent with aflatoxicosis on the postmortem examination. In addition, the VMDL toxicology section found high concentrations of aflatoxin that exceeded state and federal action levels for aflatoxins in pet foods. I immediately notified the Missouri Department of Agriculture's Feed and Seed Control Program, as well as Missouri's State Veterinarian, and they began their investigation. Once the VMDL's results were confirmed by another laboratory and the pet food brand was identified, the FDA was formally notified and Midwestern Pet Foods voluntarily recalled products suspected of being



Tim Evans is an associate professor in the MU College of Veterinary Medicine.

contaminated. Since that time, the FDA, MDA and regulatory agencies in other states have continued their investigations. On Jan. 11, 2021, Midwestern Pet Foods expanded their recall to include additional products containing corn, which were manufactured at their Oklahoma plant.

What are the symptoms in pets to look out for?

The clinical signs to look for in your pet include lethargy, vomiting, diarrhea and potentially yellow mucous membranes in the pet's mouth.

What should I do if I have been feeding my pets Sportmix pet food and they start to experience the symptoms mentioned above? Is there a treatment for animals?

The first steps are to identify whether you have been feeding or had previously fed any of the recalled products, immediately stop feeding those products to your pets, and call your veterinarian right away to have your exposed pets examined and have appropriate blood tests performed. Blood tests can indicate whether pets are exhibiting clinical signs consistent with exposure to aflatoxins. Be sure to have specific information on hand about the pet food product, such as the product's name, expiration date and barcode. Veterinarians should ask if multiple pets in a household have been eating the same food and if similar symptoms are present in multiple pets.

Aflatoxins primarily affect the liver, so prompt removal of pets from the source of the aflatoxins, as well as early diagnosis and treatment, are critical for the survival of exposed pets. There are a number of treatment options that veterinarians have at their disposal to help treat aflatoxicosis in pets. However, the potential for aflatoxin exposure is often not identified until an animal's liver is severely damaged. For this reason, it is extremely important that all potentially contaminated products be identified and recalled as soon as possible, and possibly-exposed animals be examined and treated by their veterinarians.

Which products have been recalled?

An up-to-date list of the recalled pet food products can be found [here](https://www.fda.gov/animal-veterinary/outbreaks-and-advisories/fda-alert-certain-lots-sportmix-pet-food-recalled-potentially-fatal-levels-aflatoxin) (LINK: <https://www.fda.gov/animal-veterinary/outbreaks-and-advisories/fda-alert-certain-lots-sportmix-pet-food-recalled-potentially-fatal-levels-aflatoxin>). As new information becomes available, the product list may continue to expand. Sportmix pet food products are commonly sold in both big-box retailers and online distributors.

Can pet owners report suspected contaminated pet food to the FDA?

Yes, click [here](https://www.fda.gov/animal-veterinary/report-problem/how-report-pet-food-complaint) (LINK: <https://www.fda.gov/animal-veterinary/report-problem/how-report-pet-food-complaint>) to find information on the FDA's website to report a pet food complaint. Have as much information as possible when submitting your complaint, including the name of the product, type of container, expiration date and net weight.

How does Mizzou work with the Missouri Department of Agriculture and FDA?

This recall is a perfect example that illustrates Mizzou's commitment to the 'One Health' approach. By collaborating with governmental and business industries, the research at Mizzou is aimed at service and outreach to benefit Missourians and keep animals safe and healthy.

Story courtesy of Show Me Mizzou

To arrange an interview with Tim Evans, please contact Brian Consiglio with the MU News Bureau at 573-882-9144 or consigliob@missouri.edu.

Embedded Counseling Services Can Improve Accessibility For Students, MU Study Finds

Kerry Karaffa is the first MU Counseling Center psychologist to be embedded specifically within the University of Missouri College of Veterinary Medicine, where he provides tailored counseling services for professional students training to become veterinarians. He is also aware that veterinarians are at increased risk for mental health concerns and suicidality compared to the general public due to the stressful demands of the job.

To help universities better serve students dealing with high levels of stress and anxiety, Karaffa conducted a research study in which he developed and distributed a survey to other counselors specifically embedded in veterinary medical programs at universities throughout the country. He hoped to better understand the benefits they provide to their students and create a blueprint for practicing counselors and college administrators considering embedded counseling services in specific programs or colleges on campus. He concluded that embedded counseling services offer a convenient way to increase accessibility to mental health services for students with demanding schedules and made several suggestions for developing and sustaining these services.

“The benefit of being embedded specifically within the MU College of Veterinary Medicine is that I have a greater understanding of the challenges veterinary medical students have, and I am better prepared to tailor services to meet the needs of the students I work with,” Karaffa said. “Veterinary medical students may work very long hours in their courses and clinical training, so the fact that my office is located just down the hall from them means they don’t have to go all the way across campus to the Counseling Center if their schedule doesn’t allow that flexibility.”

Karaffa added that as more universities start to consider embedding counselors in specific programs or colleges on campus, several factors should be considered. These include logistical factors such as office space and information technology resources, ethical and practice challenges, as well as the need to hire licensed, well-qualified counselors. In addition, providing the embedded counselors with mentorship and professional development support can ensure a smoother transition.

“While this particular study focuses on counselors embedded within colleges of veterinary medicine, I also want to help counseling center directors and university administrators who are truly just trying their best to serve their students in a variety of ways,” Karaffa said. “Medical schools and law schools are other areas where graduate and professional students are often under a lot of stress, so those could be areas where embedded counseling services could offer tremendous benefits to students going forward.”

In addition to improving mental health on college campuses, Karaffa believes improving accessibility to counseling services will benefit students even after they graduate from school and enter their various professions in society.

“People who are psychologically healthy tend to be happier with their jobs and do better work,” Karaffa said. “They also tend to have happier relationships, so early intervention and prevention work is always better than waiting until a small problem turns into a big one.”



Kerry Karaffa is a MU Counseling Center psychologist embedded within the University of Missouri College of Veterinary Medicine.

“Embedded student counseling services: Insights from veterinary mental health practitioners” was recently published in the *Journal of College Counseling*. (LINK: <https://onlinelibrary.wiley.com/doi/full/10.1002/jocc.12171>)

Story courtesy of Show Me Mizzou

Contact: Brian Consiglio, 573-882-9144, consigliob@missouri.edu

Genetically Modified Mosquitoes Key to Stopping Zika Virus Spread

In 2016, the World Health Organization called the Zika virus epidemic a “public health emergency of international concern” due to the virus causing birth defects for pregnant women in addition to neurological problems. Since then, researchers have wrestled with different strategies for controlling the spread of Zika virus, which gets transmitted to humans from female mosquito bites.

One approach, which was approved by the Environmental Protection Agency in May, will release more than 750 million genetically modified mosquitoes into the Florida Keys in 2021 and 2022. These “suicide mosquitoes” are genetically-altered to produce offspring that die before emerging into adults and therefore cannot bite humans and spread disease.

However, wiping out future generations of mosquitoes may cause environmental complications, such as potentially disrupting food chains. A new research study at the University of Missouri offers another option: genetically modifying mosquitoes to be resistant to Zika virus altogether.

Alexander Franz, an associate professor in the MU College of Veterinary Medicine, collaborated with researchers at Colorado State University by using CRISPR gene-editing technology to produce mosquitoes that are unable to replicate Zika virus and therefore cannot infect a human through biting.

“We genetically manipulated these mosquitoes by inserting an artificial gene into their genome that triggers one of the immune pathways in the midgut to recognize and destroy the RNA genome of Zika virus,” Franz said. “By developing these mosquitoes that are resistant to the virus, the disease cycle is interrupted so transmission to humans can no longer take place.”

Franz added that the genetic modification is inheritable, so future generations of the altered mosquitoes would be resistant to Zika virus as well.

“We are interested in strategies for controlling insect vectors like mosquitoes that transmit various viruses affecting human health,” Franz said. “Public health experts suggest having a toolbox with different approaches available to tackle a virus such as Zika, and unfortunately right now there are limited options. There is no vaccine for the Zika virus available and spraying insecticides has become ineffective since the mosquitoes can develop resistance, so we are simply trying to expand the toolbox and provide a solution by genetically modifying the mosquitoes to become Zika-resistant.” Franz’ research is designed to help prevent another outbreak of Zika virus disease from occurring.

“If you can ever find a way to block the transmission of a pathogen that negatively affects humans, that is good news,” Franz said. “We have shown this is a viable option for genetically modifying mosquitoes in a lab setting. There would need to be thorough discussions about regulatory compliance to see if this can be a solution out in the field down the road, and who knows when another Zika outbreak might happen in the future, which is why this research is so important.”

“The Antiviral Small-Interfering RNA Pathway Induces Zika Virus Resistance in Transgenic *Aedes aegypti*” was recently published in *Viruses*. Co-authors on the study are Adeline E. Williams, Irma Sanchez-Vargas, William R. Reid, Jingyi Lin and Ken E. Olson. The study was funded by the National Institutes of Health.

Story courtesy of Show Me Mizzou

Contact: Brian Consiglio, 573-882-9144, consigliob@missouri.edu



Zika virus gets transmitted to humans from female mosquito bites.



Alexander Franz is an associate professor in the MU College of Veterinary Medicine.

VMDL Technician Ameia L'Kay Ferguson Has Passed Away

Ameia L'Kay Ferguson, 46, of Columbia, Missouri, passed away on Monday, Jan. 25, 2021, at her home. Memorial services will be held at noon, Friday, Feb. 5, 2021, at St. Luke United Methodist Church. Visitation will be from 11 a.m. to noon, Friday at the church.

Ameia L'Kay "Kay Kay" Ferguson, the daughter of Helen M. Ferguson and Earnest Willis, was born July 19, 1974, in Gary, Indiana. She began her formal education in Milwaukee, Wisconsin. Upon graduating high school in 1993, she moved to Fort Jackson, South Carolina, where she would complete basic training to become a member of the United States Army. After basic training, she returned to Milwaukee to begin the next phase of her journey and started her family. Some years after giving birth to three daughters, she relocated to Columbia, Missouri.



She earned an associate's degree in applied science for medical laboratory technicians in 2012 from Moberly Area Community College. Shortly after graduation, she began her career at the University of Missouri Veterinary Medical Diagnostics Lab working in the Clinical Pathology section.

Ferguson started dancing in the eighth grade at Kosciuszko Middle School and continued at the Milwaukee High School of the Arts. She developed a love for painting canvasses and getting tattoos. In her leisure time, she enjoyed camping, hiking and exploring the outdoors. In August of 2020, she completed a 28-mile hike in just two days.

She is survived by her mother, Helen M. Ferguson, her father, Earnest Willis, her daughters, A'Lexus Carson, Ashlee Carson and Amya Carson, sister, Kendra Ferguson, brother, Andrae Griffin, and six nieces, five nephews, aunts, uncles, cousins and friends.

A fund has been set up to help support her daughters: <https://www.gofundme.com/f/celebration-of-ameia-fergusons-life>

Register For New Veterinary Education and Training ECHO

University of [Missouri's Veterinary Education and Training \(VET\) ECHO](https://showmeecho.org/clinics/veterinary-education-training/) (Link: <https://showmeecho.org/clinics/veterinary-education-training/>) will improve livestock medicine by supporting veterinarians throughout the state. A team of specialists will offer interactive online learning sessions to create a collaborative and inclusive community that enhances outcomes for producers. The new ECHO's expert team will consult with practitioners from **12 to 1 p.m. the second Tuesday of each month, beginning March 9**. Register at <https://showmeecho.org/>.

[VET ECHO](#)'s expert team includes leading university scientists and educators, extension officials and others. They will share evidence-based knowledge and facilitate collegial consultation on herd health and individual livestock animal health concerns. VET ECHO offers free continuing education credit and is provided at no cost to participating sites and individuals. Veterinarians, technicians and students are encouraged to apply.

MU is a global leader for ECHO (Extension for Community Healthcare Outcomes). About 6,000 Missouri providers in health, education and other professions in 112 counties have participated in [Show-Me ECHO](#). Register and learn more at <https://showmeecho.org/>.

Sounding the Alarm to Save Pets

University of Missouri veterinary toxicology expert and MU alumni work to notify public about dog food brand linked to animal deaths.

The Lebanon Veterinary Clinic had only been open for a few weeks when David Sikes received a desperate call from a dog breeder. His animals were falling sick, and some were dying. He needed help immediately.

It was just days before Christmas 2020. Sikes was still settling into his new practice, but calls like this were among the many reasons he attended the University of Missouri College of Veterinary Medicine: to help animals – and by extension, the people who care for and love them.

Sikes did what he was trained to do.

“I told the owner I would do my very best and try to find out why his dogs were dying,” he said.

Little did Sikes know that his call of duty would lead to a string of connections between him, an MU veterinary toxicology expert and another MU veterinary college alumna, resulting in the voluntary recall of a line of dog food, which by extension, saved the lives of potentially hundreds, maybe thousands, of pets.

“It doesn’t get much better than this when it comes to showing the strong relationships we build with our students and with governmental and business industries,” said Tim Evans, an associate professor in the MU College of Veterinary Medicine and head of the toxicology section in MU’s Veterinary Medical Diagnostic Laboratory (VMDL).

(Link: <https://vmdl.missouri.edu/>)

Evans was the expert who reached out to the Missouri Department of Agriculture and the Food and Drug Administration to sound the alarm about the suspect food produced by Midwestern Pet Foods, Inc. The company voluntarily recalled the Sportmix brand pet food on Dec. 30, 2020, and the FDA issued a warning (Link: <https://www.fda.gov/animal-veterinary/outbreaks-and-advisories/fda-alert-certain-lots-sportmix-pet-food-recalled-potentially-fatal-levels-aflatoxin>) about the pet food. The case remains under investigation by the FDA, and the FDA is aware of more than 110 pets that died after eating the food.

In the days before the recall, however, Sikes and his staff spent hours at the breeding facility, trying to uncover the cause of the problem. He began with the systematic practice of veterinary medicine he learned at MU, starting with physical exams of the dogs and a series of tests to give him an overall condition of the animals and what bodily systems were being affected. Next, Sikes created a list of possible causes and began a careful process of elimination.

“The best advice I received at MU was you will miss more by not looking than by not knowing,” he said.



Dr. John Sikes with a patient at his clinic in Lebanon, Missouri.



Tim Evans

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Sikes knew the dogs' condition wasn't an accident, injury or genetic condition. An external source was causing liver failure in many of the dogs. With test results still out, Sikes considered what outside elements he could control for the moment: Food, water and a potential zoonotic disease called leptospirosis. All the dogs were started on antibiotics, and the owner was given additional safety precautions to follow.

"Water-borne contaminants were considered and discussed with the owner as a next diagnostic step, if infectious and toxin causes were not identified," Sikes said.

So, he told the breeder to change the dogs' food immediately, and he did.

In the meantime, Sikes called Evans, his former professor at MU, to discuss the case and confirm what tissues and special handling requirements were needed for toxicologic screening, if another patient should die.

Turns out, Sikes' hunch about the food was right: Evans' testing at VMDL showed it contained high, potentially fatal levels of an aflatoxin that exceeded FDA regulations. Aflatoxin is produced by mold that grows on corn and other grains, and the toxin can poison animals.

From there, proper notifications were made, and the dog food was taken off the market.

The Mizzou trifecta came with the involvement of Amber McCoig, another former student of Evans, and the FDA's deputy director for the Division of Compliance at the Center for Veterinary Medicine. A 2005 graduate of the MU veterinary college, McCoig was actively involved in the investigation from the beginning. She also is an adjunct professor for the MU Department of Public Health and teaches vet student veterinary public health policy.

"I am very lucky to be a part of the MU College of Veterinary Medicine," she said. "I work with a large group of people who support the mission of protecting human and animal health."

Sikes said the investigation has been exhausting and heartbreaking, especially for the dog breeder. Still, the experience has shown him the value of strong relationships in times of crisis.

"I never expected to be involved with a nationwide recall, that wasn't on my career goals," Sikes said. "Without the help of Dr. Evans and everyone else involved, I don't think we could have addressed this as quickly as we did."

CVM IT Leadership Changes Announced

The University of Missouri's distributed Division of Information Technology is creating a new organizational unit and has tapped longtime College of Veterinary Medicine IT chief Matthew Keeler to help lead the effort. The new unit will combine research IT teams at MU and Missouri S&T. Keeler will serve as the associate director at MU while also leading application development services.

As he transitions into his new position, Keeler said he will work with the CVM IT staff for a half a day per week throughout March.

"With the application development hat on, I'll continue to work with the CVM as we already have a partnership to provide programming needs for the college, a model I hope to build on," he added.



Tonya Mueller

Tonya Mueller, who has been the IT team lead for MU's College of Agriculture, Food and Natural Resources since 2018, will add the IT leadership role at the CVM to her responsibilities while continuing her work with CAFNR's IT team.

Mueller's IT career began while she was an agronomy graduate student in CAFNR's Division of Plant Sciences. Early on she assisted with server, web, desktop and software support for faculty and staff in Waters Hall. In 2000 she was hired into a full-time position supporting the entire Division of Plant Sciences. Her position expanded into a supervisory role as Plant Sciences launched a graphics lab with another IT support staff position. In 2018 as part of the campus IT transition project, Mueller was promoted to manager of IT and was named the team lead for CAFNR.

All help requests should continue to go to cvmhelp@missouri.edu.

The D.V.M. – The Dean’s Video Message (February 2021)

Video Link:

<http://cvm.missouri.edu/the-d-v-m-the-deans-video-message-february-2021/>

View the archive:

<http://cvm.missouri.edu/the-d-v-m-the-deans-video-message/>

MU Announces \$11 Million Gift to College of Veterinary Medicine

MU alumni Glenn Linnerson and his wife, Nancy Linnerson, have given an \$11 million contribution to the University of Missouri College of Veterinary Medicine. The estate gift, the largest in the college's history, will establish the Dr. Glenn R. and Nancy A. Linnerson Imaging Center, which will further comparative and translational medicine research at MU.

Video Link: <https://vimeo.com/515874814>

"Together with the MU Research Reactor and the upcoming NextGen Precision Health building, these facilities will help accelerate new pharmaceutical drugs and biomedical devices to improve patient care," said Mun Choi, University of Missouri president. "Mizzou is home to world-class medical imaging resources, and now, with this gift, we can honor the Linnerson's legacy by taking our research to the next level."

Glenn and Nancy Linnerson met in Columbia when they were college students and remained connected to their alma mater throughout their lives.

"Nancy and I spent considerable time discussing how their planned gift could continue the commitment she and Glenn had to veterinary medicine, while contributing to biomedical discoveries that benefit both humans and animals," said Carolyn J. Henry, dean of the University of Missouri College of Veterinary Medicine. "The Linnerson Imaging Center will do just that by equipping the College of Veterinary Medicine to play an essential role in translational medicine at MU and beyond. We are so grateful to the Linnersons and this estate gift, which is the single largest gift our college has ever received."

Both Linnersons graduated from MU in 1954. Glenn Linnerson graduated from the College of Veterinary Medicine, and Nancy Linnerson graduated with a degree in human environmental sciences.

"Estate gifts such as the one so generously provided by the Linnersons help ensure that our faculty and students have the tools they need to conduct groundbreaking and innovative research for generations to come," said Jackie Lewis, vice chancellor for Advancement at MU. "Their legacy will only grow with every breakthrough and every life saved because of the work done at the Linnerson Imaging Center."

Veterinary research aimed at treating various cancers and diseases in animals can also inform treatments for humans with similar diseases. The Linnersons were passionate about comparative and translational medicine, with a particular interest in prostate cancer and comparative oncology.

"The imaging equipment that this endowment will allow us to acquire will not only improve diagnostic capabilities for treating animal patients, but also has the potential to capitalize on Mizzou's existing strengths and resources, like the MU Research Reactor, to expand medical studies," said Kevin Lunceford, supervisor of the Veterinary Health Center's radiology service. "Simply put, this gift will save lives

*Story courtesy of Missouri News Bureau
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3D Printing Helps Amish-owned Horse Recover Post-tracheotomy

MU equine veterinarian works with engineering students to custom-print device, assist horse with breathing issue.

Video Link: <https://vimeo.com/525028475>

When Ronnie, a 2,000-pound draft horse owned by an Amish family in Clark, Missouri, started having trouble breathing, he was taken to the University of Missouri College of Veterinary Medicine. There, equine veterinarian Joanne Kramer surgically created a hole in the horse's windpipe to help him breathe easier and bypass a permanent airway obstruction.

However, there was still an issue holding Ronnie back. He was a working horse and needed to be in top physical shape to meet the demands of his daily farm tasks.

"After the tracheotomy, Ronnie was just fine walking around, but he had some extra skin around the hole in the windpipe that kept flapping into the hole when he was out on his family's farm plowing the fields, causing him to tire very easily," said Kevin Keegan, a professor in the College of Veterinary Medicine that oversaw Ronnie's recovery. "What we needed was some type of device to put in the windpipe hole that would allow air to come in while still blocking out the extra skin, dust and bugs."

So, Keegan teamed up with two undergraduate students in the MU College of Engineering, who are also members of MU's 3D printing club. The collaboration resulted in an innovative solution that highlights the power of precision medicine, one of the key cornerstones of the NextGen Precision Health Initiative.

"We created a device using thermoplastic polyurethane filament, which is a flexible material," said Holly Anderson, a senior from St. Louis majoring in biomedical engineering. "Most filaments tend to be much harder and stiffer, but we needed something we could squeeze into the horse's trachea that wouldn't crack or deform over time."

After the first prototype was created, Keegan and the students tried to schedule a meeting with Ronnie's owner, but that turned out trickier than expected because the Amish traditionally do not use cell phones or other forms of technology.

A woman who serves as an intermediary between the Amish community in Clark and the general public was able to help Keegan and the students arrange a time for the visit. But soon after arriving on the farm, they realized the device was too big for Ronnie's hole in the windpipe.



Kevin Keegan is a professor in the MU College of Veterinary Medicine.

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“So, we knew we needed to make some adjustments,” said Griffen Mustion, a junior from Springfield, Missouri, who is majoring in biomedical engineering. “I stuck my fingers into the gap of the horse’s throat to see how deep it was, and then we went back to the 3D printing lab to make some tweaks to the device’s size, height and depth.”

Eventually, the students found the perfect balance between making the device stiff enough to stay in place, but flexible enough to bend and expand to the right fit. They returned to the Amish farm and successfully inserted the device into Ronnie’s trachea, which drastically improved his breathing and allowed him to resume his farm duties with the rest of the draft horses.

“This was a great opportunity to combine my passion for 3D printing with an opportunity to help a patient,” Anderson said. “I’ve always been interested in how prosthetics can help in the area of biomedical engineering and being able to improve the health of Ronnie the horse was pretty cool, too.”

Mustion added that while the patient was a 2,000 pound horse in this case, the project showcased how 3D printers can be utilized in precision medicine to help animals or people with various health issues.

“3D printing allows you to customize your product so that it fits the patient perfectly,” Mustion said. “With rapid prototyping, you can make tweaks until the product is how you want it, and that ties into precision medicine because we want to design solutions for patients that meet their needs exactly.”

Keegan, who has been an equine veterinarian at MU for the past 30 years, has recently been contacted by a horse owner in Texas with a similar problem to Ronnie’s, and the team is now collaborating on another custom device to see if they can help.

“I think this project showed that custom devices for each animal are the way to go moving forward,” Keegan said. “Rather than a one-size-fits-all solution, we can measure the hole in each horse’s trachea after the tracheotomy and 3D print a prototype to see if the device fits. I’m just doing my job, but it was a team effort, and I am happy to help.”

Story courtesy of Show Me Mizzou

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Developing a targeted delivery system to treat cancer

Link: <https://engineering.missouri.edu/2021/02/developing-a-targeted-delivery-system-to-treat-cancer/>

How the CVM has Continued to Thrive Through COVID-19

From March 2020 through today and into the future, COVID-19 has changed the lives of everyone at the University of Missouri and across the country. Throughout the pandemic, the University of Missouri College of Veterinary Medicine has striven to provide students with an education and experiences equal to those they would have received if it had not happened.

CVM Dean Carolyn Henry, DVM, MS, said while this process has not been easy, the CVM has been able to move through it successfully. “Going into this, there was a perception that because the experience was going to be different for our students, they wouldn’t come out on the other side as well trained,” she said. “I believe that they received as good, if not better training, because of smaller groups and more time to interact with faculty. I think the things they learned about resilience are going to take them so far in veterinary medicine in ways that the regular curriculum doesn’t do.”

The changes made to the learning approach has helped the CVM continue forward and keep students on the right track in their veterinary education. Hands-on, in-house learning wasn’t initially possible due to the uncertainty of COVID, and students were not allowed in the Veterinary Health Center during an 11-week period, spanning from late March until mid-June. Associate Teaching Professor Joanne Kramer, DVM, DACVS, said the college looked carefully at what portions of the curriculum could be moved online to keep students safe once they were allowed on campus in limited capacities. “We had to figure out what had to be hands-on, face-to-face, experiential learning right then and there and what could possibly be done remotely,” she said. “That’s helped us cut down on the total amount of time and total number of people who have to be in one place at one time. It’s been a big shift for us.”

There were a few exceptions for students being allowed into the CVM from March through June. These exceptions came when students were hired by the Veterinary Health Center to help during times where the workload was too much for the already limited faculty and staff to handle. David Wilson, DVM, MS, director of the VHC, said approximately 65 students were hired to assist in the VHC. “When everything hit, we went to half-staff and released all students in late March, and immediately we knew we couldn’t actually make that work,” Wilson said. “Within two weeks we were hiring back students who voluntarily wanted to be there. We paid these students to be there for that time, and those students had no drop in their clinical activities. We still never had more than half of the personnel that we normally have in the clinics. Typically, we have around 140-150 students on clinical rotations at any one time, but we only used around 30-35 of the 65 at a given time during the pandemic, as they were part-time employees.”

A small number of student employees were also hired to assist at the livestock market in Mexico, Missouri, during the early days of the pandemic. Upon the return of students and the lifting of some restrictions, the livestock market shifted to utilize students in smaller group sizes, taking three students instead of six, and half as often, only making one trip per group, rather than two. Beginning in January 2021, the livestock market returned to its typical six-person group sizes and regular schedule of visits.

Under the direction of faculty, CVM students perform important visual inspections and tag a variety of livestock, including sheep, goats, pigs and cattle, to ensure that they are suitable for sale. “This is for disease traceability,” explained Loren Schultz, DVM, MS, associate teaching professor of veterinary medicine and surgery. “If an animal shows up later with a regulatory disease, we can then trace them back to the farm of origin. After the sale starts, we work for the buyers. We perform castration, deworming, vaccination, dehorning, etc., as well as writing health papers for animals that will be going interstate.”

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Hybrid learning was a big part of being able to cut down on the amount of time spent face to face, as well as the number of people who were gathering. Once students returned to the hospital for clinical training, normal group sizes for some activities were reduced by half, while the other half of the group would learn remotely. Due to the limited space available for gathering in person, some activities such as some rounds and image-based discussions were shifted to take place remotely with the help of technology. Kramer said that created some positives. “Whether we wanted to or not, we are all way better at handling and integrating technology into both teaching and client communications,” she said. “Cameras were installed in surgery suites so that students could watch the procedures remotely. In some instances, this allowed for a better view of the procedure and for more focused discussions after the procedures. All this pivoting has forced students and clinicians to really understand each other’s lives a little bit better. We now understand what an instructor had to go through to modify a class or a rotation, or what a student had to go through to get consistent internet access or rearrange their entire schedule when an externship that they had really counted on wasn’t able to happen because of COVID. I think that those are good examples of positives during this time.”



The Shelter Medicine Program adhered to a brief national moratorium of spay and neuter surgeries of shelter animals to conserve medical supplies during the early days of the pandemic. Once this was lifted, students in the CVM’s shelter medicine rotation returned for their surgical instruction in smaller groups and have continued to complete their required Shelter Medicine rotations throughout the pandemic.

Safety measures have been key for the entire country to help manage COVID. From wearing face coverings to always staying 6 feet apart, the members of the CVM worked to ensure these measures were taken at the college. John Dodam, DVM, PhD, MS, chairman of the Department of Veterinary Medicine and Surgery, detailed specific measures that were taken to keep students and faculty safe. “We implemented a plan that was approved by Mizzou and involved several things including wearing medically approved masks, allowing for physical distancing as much as possible given what we do, hand washing, surface decontamination and symptom checking,” Dodam said. “We used those pretty basic public health principles to try and minimize the risks when students returned to the hospital.”

One situation that required a change in protocols was the travel to farm calls that involved the college’s ambulatory vehicles. Initially, to reduce the amount of time spent in close contact, not all rotations had students go along on ambulatory calls. The option became available for students again when they were able to return to the hospital. Students were also given the option to transport themselves to farm calls, which isn’t ordinarily the case. Ambulatory services looked at a few key factors to determine whether it was necessary to have students along, Kramer said. “Travel decisions were made based on learning value of the call, travel distance, and available vehicles.”

The Shelter Medicine Program followed a brief national moratorium of spay and neuter surgeries for shelter animals to conserve medical supplies during the early days of the pandemic. This ended once supply chains were deemed adequate for veterinary procedures to resume. Once this was lifted, faculty and staff of the Shelter Medicine Program returned to in-person activities, working with the Central Missouri Humane Society and other shelter partners to perform surgeries and sterilize the list of animals waiting to finalize their adoptions. Shelter Medicine students returned for their surgical instruction in smaller groups in June and have continued to complete their required Shelter Medicine rotations throughout the pandemic. Amie Burling, DVM, DACVPM, assistant teaching professor of shelter medicine, said the Shelter Medicine Program continued to accomplish its mission. “While the pandemic has brought many challenges to the Shelter Medicine program to continue

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safe, hands-on instruction for our students and services for our shelter partners, we are also proud to be a part of the rapid evolution of animal sheltering with a focus on meeting the community's needs in difficult times, keeping animals in their homes, and preserving the human-animal bond," Burling said.

Though there have been many successes and positives throughout this time, they haven't come without effort. The faculty's workload increased to provide hybrid learning for students, and students adjusted to learning virtually and changed the way they have done things during their time at the CVM. Another challenge was that clients have not been allowed in the MU Veterinary Health Center, requiring students and clinicians to meet with clients in the parking lot before treating their pets.



One change in Veterinary Health Center procedures to help prevent COVID-19 from spreading was to have students and clinicians to meet with clients in the parking lot before bringing animals inside for treatment.

"It's been difficult to not have clients come into the clinic, and to have to do more of the communication by phone or outside," Kramer said. "In the daytime and during nicer weather, it's not such a big deal, but we have lots of emergency clients and you're seeing those cases in the middle of night in the freezing cold, dark parking lot about critical issues, so that's been really difficult for us."

Dodam said because of the enthusiasm for the veterinary profession, all involved did what they had to do to continue to thrive through COVID. "Students were eager to come back into the clinic and they wanted to be here badly," he said. "The same was true for our faculty and staff. Every faculty member's workload went up because of this, and I appreciate what they did to help achieve what we've achieved, and the same is true for our staff."

"We were able to maintain our service to the public and we were able to meet the educational needs of students," Henry said. "We graduated the Class of 2020 on time, were able to maintain our accreditation standards for our current students, and it drove us to modernize our teaching methods to a degree that I don't think we would have done as quickly without that influence. We also had a record number of applicants this year to vet school, so I think that it has certainly not hurt our profession."

By Nick Childress

CVM Moves Closer to BSVT Program Launch

The University of Missouri Board of Curators recently approved the College of Veterinary Medicine's proposal to offer a bachelor's degree in veterinary technology. The online curriculum is a degree completion program for veterinary technicians who have already earned an associate's degree.

"This is geared toward nontraditional students who are working full time in the profession," said Cindy Cravens, DVM, director of the fledgling program. "It is all online and asynchronous, so students can work the courses into their schedules."

The program, pending approval from the Missouri Department of Higher Education, will launch this fall. The Mizzou CVM is the first college of veterinary medicine in the country to offer a bachelor's degree completion program, Cravens said.

"We have an established master's program in biomedical sciences. This program bridges the gap between an associate's degree and the master's program," Cravens said.

Research has shown that earning a bachelor's degree can lead to increased salaries for veterinary technicians, as well as opportunities for leadership positions within their current place of employment, Cravens noted. Technicians working at the MU Veterinary Health Center can qualify for tuition assistance as they work to earn their bachelor's degree.

"A bachelor's degree also opens new doors if they move into a different career path, such as industry positions in animal health," she said.

Most courses will be taught by MU CVM faculty and staff with some adjunct instructors. Much of the coursework already exists through the CVM's established online learning opportunities. "We're hoping as the program grows that we can expand the electives we offer," Cravens said.

The BSVT program will accept technicians who have earned their associate's degree through American Veterinary Medical Association-accredited Associate of Applied Science programs.

Cravens was hired about 18 months ago to get the MU BSVT program off the ground. The launch of the program was made possible through a gift from CVM alumnus James Nave, DVM '68. With the approval of the state, it will begin at the same time as a new collaborative program with Moberly Area Community College. The MACC program allows prospective veterinary technicians to earn an associate's degree in veterinary technology. The five-semester program will allow students to undertake didactic studies though at MACC and clinical training at the VHC.

"This will give their graduates more hands-on training, helping them be job ready," Cravens said.



The completely online, asynchronous structure of the MU College of Veterinary Medicine's new Bachelor of Science in Veterinary Technology Program will allow veterinary technicians to continue working while earning their degree.



Cindy Cravens

Class of 2021, Faculty Recognized During Awards Ceremony

On Thursday evening the MU College of Veterinary Medicine held an Awards Ceremony for the Class of 2021. The event took place virtually and featured the presentation of more than 50 awards to graduating veterinary medical students. CVM Dean Carolyn Henry, DVM, MS, and Angela Tenison, DVM, associate dean for student and academic affairs announced the award winners. Donors of some of the awards were also in attendance during the virtual event.

In a change from years past, the Class of 2021 had a separate awards ceremony. An awards ceremony for the VM-1 through VM-3 classes will be held later this month.

An additional two honors were given to faculty members who were chosen by the graduating class. Each year, students select a faculty member who has made immense contributions to their education and progression through the veterinary curriculum to receive a Golden Aesculapius Teaching Award. Students in the class of 2021 chose Austin Hinds, DVM, MS, DACVIM, as their honoree. Hinds is an associate teaching professor in food animal medicine.

The graduating class also honored a resident who had the greatest impact on their clinical experience. Bathilda Lake, DVM, a resident in small animal emergency and critical care, was chosen by the class of 2021 as the recipient of the award.

The presentation of the awards and recipients [can be found here](https://cvmweb.missouri.edu/docs/2021VM4AwardsPresentation.pdf) (Link: <https://cvmweb.missouri.edu/docs/2021VM4AwardsPresentation.pdf>)

By Nick Childress

CVM Class of 2021 Receive Hoods and Diplomas During Socially Distanced Commencement

The University of Missouri College of Veterinary Medicine graduated 115 new doctors of veterinary medicine on Sunday in a ceremony that was markedly different from previous commencement exercises. Despite the absence of handshakes or hugs between graduates and platform party members, COVID 19 didn't prevent a few elbow bumps. Nor could the pandemic dampen the excitement of the country's newest veterinarians or the enthusiasm of family and friends who watched the investiture of their loved ones either from socially distanced pods within Miz-zou Arena or via Livestream



University of Missouri President and MU Chancellor Mun Choi led the platform party processional to begin commencement for the CVM Class of 2021.

CVM Dean Carolyn Henry, DVM, MS, thanked the graduates for the many contributions they made to the college during their academic career, from organizing the college's annual open house to serving as liaisons between the college and Veterinary Health Center clients.

"They have done all these things while simultaneously learning the science and clinical medicine necessary to become world-class veterinarians," she said. "And this group of 115 achieved the right to sit in those seats today during unimagined circumstances, all the while showing resilience, humor and grace. Every person in this room is proud of you. And you should be so proud of yourselves."

Several university leaders also offered congratulations through a prerecorded video.

"Congratulations, Tigers," said Mun Choi, PhD, president of the University of Missouri system and MU chancellor, who was a member of the platform party. "I am so proud of you. Your resilience, your commitment to excellence and your positive approach to life were tested like never before, and you've shown incredible strength and grace through it all.

"And graduates, with the perspectives that you gained over the past 14 months, you will look at life much differently," he continued. "But don't fear to tread, instead explore the breadth and depth of what this life has to offer. And don't become jaded. Instead, continue to be amazed at the wonders of life."

Prior to the introduction of the graduates, David Wilson, DVM, MS, director of the Veterinary Health Center, introduced individuals present who were completing internships and residencies.



The need for social distancing relocated the CVM commencement from Jesse Hall, where it has traditionally been held, to Miz-zou Arena, permitting Taylor Jackson and her 114 classmates to be safely seated at 6-foot intervals.

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Bathilda Lake, DVM, a resident in the Small Animal Emergency and Critical Care Service, was selected by the graduates to participate in the ceremony. She explained the history and significance of the regalia. Associate Dean for Student and Academic Affairs Angela Tennison, DVM, then announced the name of each graduate.

Brian Frappier, DVM, PhD, associate teaching professor, and Colette Wagner-Mann, DVM, PhD, adjunct associate teaching professor, both in the CVM Department of Biomedical Sciences, served as the marshals for the commencement, guiding the graduates from their seats to the front of the arena to receive their hoods and diplomas.

Because of COVID safety concerns, Austin Hinds, DVM, MS, associate teaching professor of food animal medicine and surgery, also selected by the Class of 2021 to assist in the ceremony, presented each graduate with a hood, which they then placed around their own neck, rather than being hooded by a faculty or family member.

Dean Henry presented the graduates with their diplomas and President Choi offered his congratulations. Choi then conferred the degree on behalf of the University of Missouri curators.

Edward Migneco, DVM, who is president-elect of the Missouri Veterinary Medical Association, led the new doctors of veterinary medicine in reciting the Veterinarian's Oath. "Welcome to the greatest profession in the world," he concluded.

Members of the Class of 2021 chose Brad Uppinghouse, DVM, to deliver a response on their behalf.

"Together as a class we started together at VET, where we were able to meet our classmates and faculty," Uppinghouse recalled. "We were given our first glimpse into the vet school life and we also learned of the resources our school provided both academically and professionally. It was a whirlwind of a trip that was meant to prepare us for starting vet school, but I feel like no amount of preparation can truly have you ready for vet school until you experience it firsthand. It's a lot like IKEA furniture, the directions seem easy enough, but when you start putting it together you can't find what you need, and you figure out you did something wrong 18 steps earlier.



Alexandra Murray and other CVM graduates stood to acknowledge and thank family and friends attending then graduation ceremony for their support.



Brad Uppinghouse, offered the response on the behalf of his classmates.



"Until next time," CVM Dean Carolyn Henry concluded the commencement.

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“From our time together, I know each and every member of the Class of 2021 will thrive in any and all aspects of life. If two years of didactics, two years of clinical training, and persevering through a pandemic doesn’t prepare you for real life, nothing will. Congratulations doctors, the hard part is over,” he said.

To view more photos from the CVM Class of 2021 commencement, [see our album on Facebook](https://www.facebook.com/media/set/?vanity=MUCVM&set=a.10160841056354128). (Link: <https://www.facebook.com/media/set/?vanity=MUCVM&set=a.10160841056354128>)



CVM Class of 2021 members greeted their families outside of Mizzou Arena following the graduation ceremony. Alexander Cardascio’s wife congratulated him, while his baby happily pilfered his diploma.

Lighting Up Biology From Within

Researchers at the University of Missouri have created a low-cost, portable device that can apply non-invasive bioluminescent imaging technology to many uses in animals, humans.



A biochemical reaction between an enzyme called luciferase and oxygen causes fireflies to glow and is considered one of the most well-known examples of bioluminescence in nature. Now, an international team of researchers led by Elena Goun at the University of Missouri is working to harness the power of bioluminescence in a low-cost, noninvasive portable medical imaging device that could one day be applied to many uses in biomedical research, translational medicine and clinical diagnoses.

Potential uses include developing better treatments for cancer, diabetes and infectious diseases, along with monitoring various metabolic functions, such as gut health, in both animals and humans, said Goun, an associate professor of chemistry in the College of Arts and Science and corresponding author on the study published in *Nature Communications*.

“This is the first example of a low-cost, portable bioluminescence imaging tool that can be used in large non-transgenic animals such as dogs,” Goun said. “The mobility and cost-effectiveness of this technology also makes it a powerful tool for use in many areas of preclinical research, clinical research and diagnostics.”

Once the imaging probe is inserted into the body and reaches a targeted internal organ, such as the liver, the level of biological activity, such as liver toxicity, determines the amount of luciferin that is released into the bloodstream.

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Eventually, it reaches the area of the device, setting off a biochemical reaction that creates light. A portable light detector — about 10 millimeters, smaller than the diameter of a penny — is then placed on the surface of the body near the inserted device and measures the intensity of the light. The level of detected light correlates with the amount of luciferin present, which scientists can then use when determining the health of the targeted organ.

Jeffrey Bryan, a professor of veterinary oncology in the College of Veterinary Medicine and a co-author on the study, said this technology will be helpful in a clinical setting — both in animal and human medicine — where medical professionals can determine if a treatment is working inside a patient.

“This is a way we can monitor, in a minimally invasive way, a patient’s physiological response to whatever treatment is administered to him or her,” said Bryan, who is also an associate director of comparative oncology at MU’s Ellis Fischel Cancer Center. “Right now, most of the time we are looking for responses to treatment by asking the patient how they feel and then doing big, invasive, expensive tests to see if the treatment is working. Sometimes, that requires multiple procedures. But, if we can monitor for the desired effect in a minimally invasive manner and continue monitoring the progress over a long time period with this technology, that would probably reduce the need for more invasive testing.”

In addition to the diagnostic testing benefits of this technology, Goun said their approach could have the potential to significantly reduce the number of dogs, cats and non-human primates being used for experimental testing purposes by commercial drug development companies.

[“Portable bioluminescent platform for in vivo monitoring of biological processes in non-transgenic animals,”](https://www.nature.com/articles/s41467-021-22892-9) was published in *Nature Communications*. (Link: <https://www.nature.com/articles/s41467-021-22892-9>)



Elena Goun



Jeffrey Bryan

Story courtesy of [Show Me Mizzou](https://showme.missouri.edu/) (Link: <https://showme.missouri.edu/>)

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Online Biomedical Sciences Program Sparks International Collaboration

Since 2016, the University of Missouri College of Veterinary Medicine has provided a 100 percent online, asynchronous master's degree program in biomedical sciences with an emphasis in veterinary sciences. The format of the program, directed by Laurie Wallace, DVM, MVSc, DACVIM, allows students from around the country and world to earn a master's degree from the CVM. This made it possible for Jing Li, DVM, to participate in the program from his home in Beijing, China, and facilitated international collaboration between faculty at the CVM and veterinarians in China.

Li, who will graduate from the program this month, earned his DVM from the Kansas State University College of Veterinary Medicine. He then returned to China where he serves as a faculty member in the China Agricultural University's Veterinary Training Program. During the past two years, Li conducted research focused on identifying biomarkers of respiratory disease in cattle, a project that prompted Wallace to ask two CVM faculty members to serve as his advisors: Brian Shoemake, DVM, MS, a former assistant teaching professor of food animal medicine at the CVM, and Pamela Adkins, MS, DVM, PhD, DACVIM, an assistant professor of food animal medicine and surgery. "Dr. Li does work with food animals and large animals in Beijing, so I contacted Dr. Shoemake and Dr. Adkins," said Wallace. "They were game to give it a try and agreed to be his advisors."



Jing Li

Shoemake and Adkins provided support and advice for Li because his project fit into their areas of expertise. There were a few small technical difficulties, as the 13-hour time difference meant that scheduling Zoom meetings was a challenge, but in general, most class work and written communications were completed without problem. Adkins gave credit to Wallace for the organization of the online master's program that made this possible. "The whole program is set up to be open to these types of opportunities," said Adkins. "Dr. Wallace has made it really smooth and done a really good job of advertising. She does all the behind-the-scenes work and we just focus on working with the student."

In serving as one of Li's advisers, Shoemake, who now is a clinical assistant professor of veterinary large animal clinical sciences at the Texas A&M University College of Veterinary Medicine, was himself provided an opportunity to present and collaborate with Chinese cattle producers, veterinary students and veterinarians. This took place during two separate sessions that were set up by Li, who had an interest in learning more about bovine respiratory disease. "They would see the clinical manifestations, but still not have all the answers they were looking for," said Shoemake. "I think Dr. Li just wanted a general discussion to introduce the topic into Chinese production medicine and agriculture, so he requested I do this, we got the details figured out, and went from there."

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With the use of a translator, the lectures provided an opportunity for Shoemake to share knowledge internationally. This collaboration led to other positive developments. At least one student from Li's institute has already enrolled in the biomedical sciences online master's program at Mizzou, and some of the information from Shoemake's lectures is being quoted in reference material being developed by veterinarians who attended. Adkins attributes this additional outreach to the response that Li had to his experiences with the program. "Dr. Li has been so positive about the program as a whole and has stated multiple times that people around him are looking into it," said Adkins. "He was really impressed and excited about the program, so I think that this has created more opportunities for future collaboration."

Shoemake says he hopes more people see value in this program and it grows in the future. "It's such a unique opportunity within veterinary medicine," said Shoemake. "It breaks down a lot of the barriers to an advanced degree in veterinary medicine. It's innovative and I hope that more students begin to recognize this opportunity."

By Nick Childress

Ticking Upward: MU Researcher Studies Rise of Tick-borne Diseases in Midwest

When Ram Raghavan heard from a former colleague at the Centers for Disease Control and Prevention that a 7-year-old girl had died from Rocky Mountain spotted fever as the result of a tick bite, he thought of his own daughter, also 7 years old at the time, and the potentially fatal danger posed to vulnerable populations by tick-borne diseases.

Now a professor at the **University of Missouri** College of Veterinary Medicine and School of Health Professions, Raghavan is an epidemiologist studying how ticks, mosquitos and other arthropods spread disease that impact people, pets and livestock over time in various geographical regions.

In a recent study, the most comprehensive of its kind in the Midwest region of the United States, Raghavan and former graduate student Ali Hroobi collected and identified various species of ticks on the outskirts of Pittsburg, Kansas, twice a month for a 3-year period. They not only found a majority of the ticks to be most active in the humid spring and summer seasons, but their comprehensive documentation of what, when and where ticks are present help public health officials better understand the threat of tick-borne diseases to humans, companion animals and livestock.

“We have seen increases recently in both the number and severity of tick-borne diseases in the Midwest, particularly in the humid climates of Missouri, Kansas, Oklahoma and Arkansas,” Raghavan said. “Since more people get infected by tick-borne diseases each year than any other vector-borne disease, it is important that we better understand what type of ticks are present in our region, where they are located and what time of year they are most prevalent. This information will help keep us, our families, pets and livestock safe.”

Raghavan explained that several factors have contributed to the rise in tick-borne diseases. Humans are increasingly relocating from densely populated urban cities to more suburban areas on the outskirts of towns near forests and grasslands where ticks are often present. Outdoor fitness activities such as hiking, biking and walking have also become more popular, especially since the COVID-19 pandemic and particularly during the warmer spring and summer seasons in the Midwest.

Climate change has played a role as well, as the warmer temperatures and humidity seem to be creating perfect conditions for ticks and the pathogens they carry to thrive. Finally, a sharp increase in population of white-tailed deer, the primary animal host for the most common tick found in the Midwest, *Amblyomma Americanum*, is another contributing factor.

“This comprehensive research study helps us create a baseline understanding of the current situation from a public health perspective,” Raghavan said. “These contributing factors will likely continue to play a role going forward, and now we have meaningful, relevant data to look back on for comparisons to see if certain trends continue in the future.”



Ram Raghavan is a professor in the MU College of Veterinary Medicine and MU School of Health Professions.

Raghavan added that because there are currently no vaccines for tick-borne diseases, prevention practices and tick awareness are the best ways to avoid tick bites.

“Wearing protective clothing such as long sleeve shirts and pants when walking outdoors or on hiking trails is highly recommended, and spraying permethrin insect repellent can help as well,” Raghavan said. “Other common sense safety practices such as staying on the main trails away from vegetation and keeping dogs on leash can help protect you and your pets from ticks. Always check oneself and pets for any attached ticks after being outdoors. Also, visit with your doctor if you start to have any flu-like symptoms, as most tick-borne diseases are entirely curable, but early diagnosis is crucial.”

The research can help inform future studies to better identify when and where specific pathogens amplify within various ticks, their effects on disease severity, and the impact of climate change and land use change on the prevalence of tick-borne diseases.

“It is important to remember health does not operate separately for humans compared to animals or the environment,” Raghavan said. “This is a ‘One Health’ issue, and as humans, we are just a small part of an enormous ecosystem. The more we learn and understand the problems, the better we can protect ourselves against these preventable diseases.”

“Diversity and seasonality of host-seeking ticks in a periurban environment in the Central Midwest (USA)” was recently published in *PLOS One*.

Story courtesy of [Show Me Mizzou](https://showme.missouri.edu/) (Link: <https://showme.missouri.edu/>)
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Longtime Shelter Dog Adopted, Successfully Treated at VHC

On Jan. 30, 2021, Leena and Rich Ruedin of Lake St. Louis, Missouri, were far from considering pet adoption. They had lost the last of their bonded pair of dogs in mid-2019, and were still mourning. However, that afternoon, Rich Ruedin came across a story on his news feed about a 14-year-old, female, black Labrador mix named Wiggles, who had been surrendered to a no-kill animal shelter in Godfrey, Illinois, in 2010. Wiggles' owners were unable to afford her allergy medication, and it was clear that Wiggles was having other difficulties, as a tumor had been growing on her rear left leg that was approximately the size of a cantaloupe. Leena Ruedin said once she heard Wiggles' story, she was immediately sold on adopting her.

"Wiggles had been waiting for 11 years for a forever home," said Leena Ruedin. "Rich sent me the article and I read it that evening. The very next day we went and adopted her."

This feel-good adoption caught the eye of some national news outlets, as *CNN*, *People Magazine Pets* and *Inside Edition* all had posts on their website about the Ruedins and Wiggles. Wiggles, who has her own Twitter account, even garnered a mention from actor Mark Hamill, a dog-lover who is best known for playing Luke Skywalker in the *Star Wars* movies.

From the day they decided to adopt, the couple knew Wiggles had some active health issues. Although shelter employees were aware of Wiggles' tumor, their local veterinarian determined that it was benign, and opted not to remove it because of her age. Leena Ruedin was told that previous potential adopters saw the tumor and were apparently deterred, leading to Wiggles' long shelter stay. The couple decided to take her to their own veterinarian for a physical, revealing normal bloodwork, but severe arthritis in her back legs and hips, which wasn't helped by the mass on her leg. She also had a spot she would chew and scratch on the same leg, which had been diagnosed as caused by allergies. The veterinarian attempted to use laser treatments to treat the spot that Wiggles was chewing on, suspecting it was a large callus formed from lying on concrete for years, but this didn't show improvement.

The Ruedins decided to seek the help of clinicians at the University of Missouri Veterinary Health Center. "Rich and I decided that we would take Wiggles to the CVM surgical oncology team to inquire about the large mass on her hind leg and the possibility of removing it," Leena Ruedin said. "They said it could be safely done, with minimal risk."



Recently graduated veterinary student, Emily Stamer looks on as Megan Mickelson, DVM, works to remove the tumor from Wiggles' hind leg.



Veterinary assistant Ariel Boliek prepares Wiggles for discharge after giving her the best patient award.

Megan Mickelson, DVM, DACVS-SA, ACVS Fellow, surgical oncology, an assistant professor of small animal surgical oncology, and Brittney Byer, DVM, a resident in small animal surgery, greeted the Ruedins at Mizzou and decided that the mass could be removed. While the mass wasn't dangerous on its own, it weighed 3½ pounds, and was causing Wiggles a great deal of discomfort. "It was because of the pure size of the mass, and the way it was impacting her ability to walk and get around with comfort, that they decided to move forward with the surgery," said Mickelson.

The surgery was successful and Wiggles recovered normally. "She recovered really well from the surgery that we did. It was a benign mass, so on that aspect she should be just fine," said Byer.

Unfortunately, the large mass wasn't the only issue. While Wiggles was in for consultation, Mickelson examined the area on Wiggles' leg that she had been chewing. A fine needle aspirate revealed it was a plasma cell tumor, which Mickelson described as "oftentimes benign acting," but shouldn't be ignored. Wiggles initially received electrochemotherapy at MU, but after little improvement in the tumor, she is now receiving radiation therapy at the MU Veterinary Health Center at Wentzville, which is closer to the Ruedins' home. She has also been placed on a weight-loss plan. "The definitive radiation protocol gives her the best chance at remission and that's what we want," said Leena Ruedin.

Moving forward, the Ruedins plan to continue to do what they can to help Wiggles be comfortable and happy.

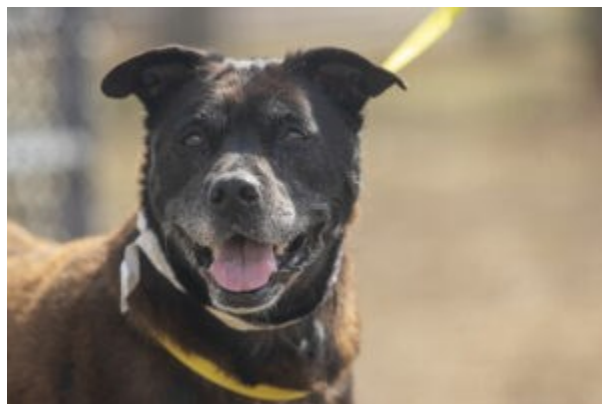
"For us, it's really cool knowing that the family was willing to adopt a dog that had lived in a shelter for that long," said Mickelson. "Not just adopt and let it live out its day, but also medically get everything in order. I just think they're really cool people and we're appreciative of them."

Leena Ruedin says throughout all of this, she and her husband never hesitated in their adoption of Wiggles. "We saw a dog that needed us and that we needed," she said. "She was filling the hole in our hearts that our previous dogs left when they passed. She makes our hearts smile."

By Nick Childress



Wiggles' care team (from left) Brittney Byer, DVM, Megan Mickelson, DVM, and veterinary student Ayla Khan, gather around her as she prepares to leave the Veterinary Health Center.



Wiggles has a significant Twitter presence with more than 800 followers. She can be followed under the handle @WigglesLaRue

2021 Dean's Impact Award Recipients Announced

Shuping Zhang, Sherri Oliver and Richard Antweiler have been named the recipients of the 2021 Dean's Impact Awards. The annual awards, established in 1993, honor faculty, staff or individuals from outside of the college for sustained and significant positive impact on University of Missouri College of Veterinary Medicine programs. The recipients were announced at the May 24 CVM town hall meeting via Zoom.

Shuping Zhang, PhD, was named the recipient of the faculty Impact Award for her service to the CVM since 2013. Zhang serves as the MU Veterinary Medical Diagnostic Laboratory director and a CVM professor. During her time at the CVM, Zhang has made numerous noteworthy accomplishments, including capturing national spotlight by being elected president of the American Association of Veterinary Laboratory Diagnosticians, a world leading organization in advancing the discipline of veterinary diagnostic laboratory science. Additionally, Zhang played a part in establishing the MU Veterinary Medical Diagnostic Laboratory as a level one facility within the National Animal Health Laboratory Network and a tier one Food and Drug Administration response unit to respond during disease outbreaks. Zhang is also currently leading the way to build a new VMDL, which will benefit the state of Missouri for the next 20 years. A nomination letter for Zhang reads, "Her work has been both outstanding and sustained. In addition, she has met and overcome insurmountable problems."

Sherri Oliver, PhD, PMP, was named the recipient of the staff Impact Award for her service to the CVM since 2003. Oliver has served the CVM for nearly 20 years, first as a postdoctoral fellow, then as a laboratory supervisor, grant writer, and currently a research administrator, a position she has held since 2013. Oliver helps lead the CVM grants team, working on proposal management and organization, as well as proposal development, budget development, proposal submission, grant writing and grant revision. Oliver, who had multiple nomination letters submitted on her behalf, is known for managing a substantial workload, while still offering help to faculty. A nomination letter for Oliver reads, "As a former researcher, Sherri is able to talk to faculty at a very technical level, however, she is also very helpful and nurturing of everyone's ideas. While she is a rather quiet individual, she is often quiet because she is simply working extremely hard, but always available to help somebody out." Another reads, "She embodies a culture of helping others advance research locally, nationally, and globally by serving our research development professionals at MU. ...Her dedication has helped us transcend many different barriers to create robust research programs aimed to spur new discovery."

Richard Antweiler, the executive director of the Missouri Veterinary Medical Association, is the recipient of the Impact Award for an individual outside the college, who has made significant contributions. As executive director, he has been known for the unwavering support that he has provided students, staff and faculty at the CVM, as well as his constant willingness to help students throughout their veterinary education, from beginning to end. A nomination letter for Antweiler reads, "I cannot think of an individual more deserving of the recognition for their sustained and selfless contributions to the veterinary profession and the University of Missouri College of Veterinary Medicine than Mr. Antweiler. He is determined, positive, and thoughtful in his actions and words and is a consummate professional."

By Nick Childress

The D.V.M. – The Dean’s Video Message (May 2021)

Link: <http://cvm.missouri.edu/the-d-v-m-the-deans-video-message-may-2021/>

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