Agriculture and Natural Resources
Update and Impacts
June 2017

STATE OF THE SCHOOL ADDRESS

In his annual State of the School address, Dean Michael Lairmore congratulated the school's community for achieving the top spot among veterinary schools in the world by QS World University Rankings for the third year running. He credits that recognition to the school's ability to attract the best and brightest students, and faculty and staff dedicated to compassionate care, clinical innovation, and high-impact transdisciplinary research. Other highlights of this past academic year include:

- Increased faculty involvement in the Biomedical and Engineering Entrepreneurship Academy with 19 invention disclosures and 16 patents filed (four have been granted so far).
- Five-year grant renewal from the NIH for the UC Davis CounterACT Center of Excellence to identify improved medical countermeasures for chemical threat agents in humans and animals.
- Development of the first PET equine program in the world - used for research on equine bone stress modeling, osteoarthritis, laminitis and tendon disease.
- Launch of the Veterinary Institute of Regenerative Cures.
- Establishment of the Bioanalytical Research Core, specializing in pharmacokinetic-pharmacodynamic studies at preclinical and clinical stages of development.
- Outstanding customer service from the hospital staff for approximately 55,000 veterinary patients this year.
- Increased availability of clinical trials through the Veterinary Center for Clinical Trials (77 currently active).
- High board certification rates among the hospital's residents.
- Broader diversity of the school's community beginning with outreach and intensive training programs for K-12 and community college students.
- Advancing the well-being of animals and people with the Knights Landing One Health Clinic and disaster response training.
- Educated and graduated 134 DVM students, 39 residents and 11 students in the Master of Preventive Veterinary Medicine program.
- Continued support from philanthropic partners that help keep student debt in check and support cutting-edge research.

He also discussed a few major challenges in particular the future Veterinary Medical Center—a 10-year master plan that will take place in phases. The complete presentation can be viewed on line at: www.vetmed.ucdavis.edu/about_vetmed/school_updates.cfm

VETERINARY MEDICAL CENTER – LEADING THE WAY

The future Veterinary Medical Center brings together the school's community of scholars, clinicians and veterinary students in facilities designed to provide efficient patient care with immediate access to state-of-the-art technologies. Basic technical skills and knowledge of livestock and the roles of livestock in our society are an important part of the student educational experience. The facility design will encourage the application of scientific discoveries from multiple disciplines to the clinical setting to enhance patient care and the educational environment for veterinary students and residents.

The Livestock and Field Service Center is the first patient service area to come online. The center has been designed in consultation with Temple Grandin, PhD, well known for her groundbreaking work in engineering humane animal facilities and is a fellow in the Society of Biological and Agricultural Engineers. Grandin partnered with us to refine preliminary plans and design the best possible environment for livestock patient handling, care and clinical teaching emphasizing modern concepts in animal welfare.

By providing a safe and controlled environment and a diverse caseload, rotations through the Livestock Medicine Service allow students to participate in surgeries such as castrations, common abdominal surgeries, C-sections and leg fracture repairs. This rotation also offers students additional experience with radiology, ultrasound, endoscopy, and even laparoscopy, CT and MRI.

FACULTY RECRUITMENTS

- Professor of Clinical Microbiology-San Bernardino (CAHFS) – interviews completed – waiting on CAHFS recommendation
- Professor of Clinical Avian Diagnostics-Turlock (CAHFS) – advertising extended
- Professor of Clinical Pathology-Tulare (CAHFS) – advertising extended
- Large Animal Clinic Director – interviews complete; discussions underway
- Specialist in Cooperative Extension-Beef Cattle Herd Health and Production – interviewing
- Specialist in Cooperative Extension-Dairy Cattle Production Health – search committee appointed
- Specialist in Cooperative Extension in Antimicrobial Stewardship - search committee appointed

CALIFORNIA ANIMAL HEALTH AND FOOD SAFETY LABORATORY SYSTEM – CAHFS CONNECTION – June 2017

The CAHFS Connection publication is produced and published electronically monthly to communicate with animal agriculture stakeholders and clients news on current disease cases and diagnostics. The June issue includes the following cases:

Bovine

- Cranial mesenteric aneurysm rupture and exsanguination caused the sudden death of two 11-16 month old Holstein heifers.
- Strangulated section of jejunum caused peritonitis and death in an adult Angus bull found dead
- Jejunal hematoma was the cause of sudden death in two adult Holstein cows in mid lactation.

Small Ruminant

- *Corynebacterium pseudotuberculosis* internal abscesses were found in a five-year-old goat with a history of decreased appetite, weight loss and front leg lameness.
- Ovine Herpesvirus-2 (OvHV-2) associated system disease was diagnosed in a 10-week-old, male castrated lamb.

Porcine

- Myelomalacia of the lumbar spinal cord resulted in paralysis of the rear legs in a 4-month-old pig after suffering anorexia and fever for a few days.

Poultry/Other Avian

- Coccidiosis and necrotic enteritis were the cause of increased mortality, and swollen and hemorrhagic intestines in several flocks of 15-28 day old broiler chickens.
- Blackhead (histomoniasis) was diagnosed in 12-week-old turkeys on two ranches with a history of increased mortality, lethargy, depression and reluctance to walk.
- Gizzard worm infestation was diagnosed in two adult roller pigeons that were part of a group of 100 individuals of which approximately 15 died within three weeks.

CAHFS Connections is available online at: www.vetmed.ucdavis.edu/cahfs/news_disease_info/index.cfm

RECONSIDERING THE CARBON HOOFPRINT

Livestock have a bad rap for being greenhouse gas emitters, though reports show that the emissions records are misleading. Livestock ranging on ranches can actually sequester carbon dioxide from the atmosphere. Rotational grazing facilitates, moving animals around fields to alternate grazing sites, gives plants the chance to regrow. Part of their growth process, photosynthesis, captures carbon dioxide from the air and, in combination with soil microbes, stores it as carbon in the soil. Herd managers appreciate this environmental benefit in large part because they know that the environment is one pillar in the "triad of disease."

The risk of disease for animals (and people) depends on three components: presence and virulence of a pathogen; immunity of an organism; and suitability of the environment. Bret McNabb, associate professor at the School of Veterinary Medicine, recommends rotational grazing and calving areas. "By keeping the environment clean, dry and with an appropriate concentration of animals, you can reduce the incidence of certain diseases, and improve the carbon hoofprint," says McNabb.

PREPARING RURAL COMMUNITY FOR DISASTERS – WESTERN INSTITUTE FOR FOOD SAFETY AND SECURITY (WIFSS)

Disasters that impact rural communities pose a substantial risk to animals and agriculture. Wildfire, flood, heat, earthquake, tornado, hurricane, hazardous materials, and catastrophic animal disease can have devastating impacts on rural communities. Rural communities are also vulnerable to intentional agroterrorism attacks. Such disasters contain the potential to affect the U.S. food supply. Moreover, severe economic loss, injury to humans and animals, environmental contamination, and death, can be the result of incorrectly responding to natural, accidental, or intentional disaster events.

Preparedness is essential for the coordination of an effective all-hazards disaster response. The WIFSS team addressed this need by developing two training courses for rural communities to help them prepare and plan for disasters that may impact animals, agriculture, and food. The target audiences for the awareness level course "All Hazards Preparedness for Animals in Disasters" and the management course "All Hazards Planning for Animal, Agriculture, and Food Related Disasters" includes local emergency response teams, emergency planners, veterinarians, animal control officials, government and non-government agencies, and tribal representatives.

Advanced training and a preparedness plan saves time during an emergency response and will increase the chances for the safety and survival of property, family, and animals. WIFSS has used a rigorous and thorough development process to develop these two new courses. Course information can be found at www.wifss.ucdavis.edu/courses.

VECTOR BIOLOGIST JOINS INITIATIVE TO FIGHT MALARIA IN AFRICA

School faculty member Greg Lanzaro, a vector biologist, is taking part in the newly-announced UC Irvine Malaria Initiative to genetically engineer new strains of mosquitoes to fight malaria in Africa. The project, led by UC Irvine's pioneering vector biologist Anthony James, will bring together experts in molecular biology, entomology, public health and community engagement from across the UC system. The goal is to develop a genetic approach to controlling malaria transmission by the mosquito *Anopheles gambiae*. The multimillion-dollar, multi-year effort is supported by a $2 million grant from the Bill & Melinda Gates Foundation, with additional support from the National Institutes of Health and other sources of funding.

Lanzaro has spent the past 35 years studying one of the deadliest creatures known to humankind—the mosquito. In particular, his research has focused on those species that transmit malaria and are responsible for nearly half a million deaths worldwide every year, 90 percent of them in Africa.

"Over the years, we've developed the technology to change the genetics of mosquitoes so that they can't harbor or transmit the malaria parasite," said Lanzaro. "What we needed was a way to ensure that these genes would be expressed and spread through natural mosquito populations."

Before mosquitoes modified in the lab can be released in the wild, they need to be tested under controlled conditions. The team estimates it will take two years to identify a suitable field site and another two to establish

a field station and collect baseline data. Then another two to five seasons are needed to measure the impact of these new strains on mosquito populations in affected regions. The researchers will follow international and national regulations, and local people will have the final say in whether or not this strategy will be utilized.

“People have been talking about this gene drive strategy since the early 90s,” Lanzaro said. “But we have to go slow. We have to study this approach where it’s contained and we have a mitigation plan in place. I don’t think we could ever say with absolute certainty that something like this could be zero risk. On the other hand, a child dies every minute from malaria in Africa.”

As part of the project, UC Davis will receive $1.7 million for the first two-year phase aimed at identifying a field site. The best candidates so far look like oceanic islands where there is very little chance that the genetically modified mosquitoes could get to the mainland.

“This project is on the leading edge,” Lanzaro says. “It’s big, with the potential to save hundreds of thousands of lives.”

PROTECTING THE NATION’S FOOD SUPPLY

Fourth-year students from veterinary schools across the country visit the school’s Veterinary Medical Teaching and Research Center (VMTRC) in Tulare to gain invaluable experience. As future food animal veterinarians, they will be on the front line of protecting the nation’s food supply by ensuring the health of animals in the dairy, beef and poultry industries.

Earlier this year, fourth-year veterinary students Margaret Austin (left) and Hannah MacDonald received hands-on training at Tulare-area dairies under the guidance of Dr. Wagdy El-Ashmawy, a resident at the VMTRC. They helped vaccinate calves, took blood samples to test for various diseases and learned more about herd health management. Both students say their experiences in working on large dairy farms have been a huge help in expanding their knowledge of herd health management, while also developing skills like muscle memory.

In Egypt, where El-Ashmawy serves as assistant professor of infectious disease at Cairo University, 70 percent of animals are owned by small farmers, although there are some large farms. The residency program with UC Davis provides him with more experience on farms with a greater number of animals.

“I’ve increased my experience in designing and evaluating epidemiology studies,” he says. “I look forward to transmitting this knowledge to my students in Egypt.”

THE CHANGING FACE OF VETERINARY MEDICINE

We live in a rich multi-cultural society where veterinarians and pet owners have different world views, languages, religious beliefs, biases, gender identity, abilities and other diverse characteristics. As a veterinary community, it’s important that we accept these differences, learn from each other and appreciate the unifying element we all share – the desire to help animals. Forty-three percent of the incoming veterinary students (Class of 2021) at UC Davis are non-Caucasian, which reflects the changing demographics of California and the nation.

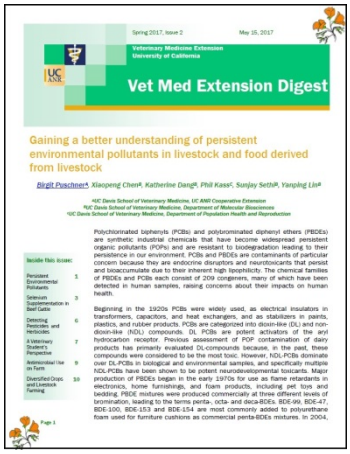
How might cultural diversity impact veterinary communications? A language barrier between veterinarian and client could impact the client's understanding of the prescription dose instructions. Due to cultural norms, that client may be reticent to ask for clarification. That difference could result in an overdose. Eye contact is another example. In some cultures, making eye contact is considered disrespectful, but westerners see direct eye contact as a sign of attention and trust.

Students, faculty and staff at the school have the opportunity to participate in educational activities, workshops and seminars to learn about and embrace the range of cultural differences that make up society, and help us to deliver better veterinary care. One initiative funded annually by the school provides for ten students, faculty and staff to participate in the online certificate training program offered by the Center for Excellence for Diversity and Inclusion in Veterinary Medicine, jointly sponsored by Purdue University College of Veterinary Medicine and the Association of American Veterinary Medical Colleges. The program is designed to improve their communication, leadership, teaching, learning, and cultural competency skills.

"I found the program worthwhile as there is so much research into inclusion and diversity that I did not know and some of the recommendations for how to approach a diverse client population were new to me."
~ Katherine Hansen, Assistant Professor

Program participants complete a series of 13 learning modules, three hours of community engagement, four one-hour pertinent activities (i.e. lectures, festivals, art exhibits), and a final capstone paper. Certificates and nine hours of continuing education credit are awarded upon completion.

VET MED EXTENSION DIGEST



This new electronic publication from the Veterinary Medicine Cooperative Extension Team is being published quarterly. The most recent issue includes:

- Gaining a better understanding of persistent environmental pollutants in livestock and food derived from livestock
- Methods of selenium supplementation for beef cattle and associated weight gains
- Detecting pesticides and herbicides in the Sacramento-San Joaquin Delta
- Building foundations: a veterinary student at the VMTRC
- Tackling antimicrobial use on the farm: reviewing concepts and preparing for the future
- Diversified crops and livestock farming

Check out the full online version:
www.vetmed.ucdavis.edu/vetext/local_resources/pdfs/pdfs_newsletter/VM_Edition2_Spring2017.pdf

AWARDS AND HONORS

The school's 2017 Alumni Achievement Awards were presented during the Commencement Ceremonies. This year's recipients were:

- *Dallas Hyde* - In recognition of his outstanding leadership and accomplishments in administration, research, postgraduate education and professional service in the school.
- *Jonna Mazet* - In recognition of her superior research and teaching toward improving global health for people and animals, and conservation of threatened species.
- Bill Rood - In recognition of his leadership and community impact as the co-founder of Rood and Riddle Equine Hospital.

- *Ted Stashak* - In recognition of his sustained commitment and efforts to advance the education and knowledge of veterinarians, farriers, and horse owners to improve the health and wellbeing of horses.
- *John Stuelpnagel* - In recognition of extraordinary contributions to society through his pioneering work, entrepreneurial spirit and vision for the application of genetic sequencing.

Each year members of the faculty receive awards in recognition of their service, research, and teaching contributions. This year the following faculty were honored:

- *Patricia Conrad,* 2017 AVMA Lifetime Excellence in Research Award
- *Larry Cowgill*, 2016 Hill's American College of Veterinary Emergency & Critic Care Jack Mara Scientific Achievement Award
- *Travis Henry*, Robert Wiggs 2016 American Veterinary Dental College Outstanding Candidate Award
- *Kate Hurley*, 2017 Maddie Hero Award, Maddies Fund
- *Marguerite Knipe*, UC Davis Academic Federation's 2017 Award for Excellence in Teaching
- *Christine Kreuder Johnson*, UC Davis Academic Senate's 2017 Distinguished Public Service Award
- *Jonna Mazet*, 2016 Zoetis Award for Research Excellence
- *Jonna Mazet*, 2017 Remarkable Women of UC
- *Jonna Mazet,* 2017 Tom Hall/Nelson Sewankambo Mid-Career Award from the Consortium of Universities for Global Health (CUGH)
- *Jorge Nieto,* 2016 SVM Faculty Clinical Excellence Award
- *Joanne Paul-Murphy*, Award for Outstanding Services to Kakapo Conservation
- *Sue Stover*, 2016 University of Kentucky Equine Research Hall of Fame
- *Sue Stover,* 2016 AVMA Lifetime Excellence in Research Award
- *Bill Vernau*, UC Davis Academic Senate's 2017 Distinguished Teaching Award
- *Bill Vernau*, SVM 2016 Distinguished Faculty Teaching Award

Upcoming Continuing Education Offerings

July 22-23 10th Annual Back to School Seminar, UC Davis
October 13-15 Fall Festival, UC Davis

For a full listing of CE programs please visit the web site at: http://www.vetmed.ucdavis.edu/CE/

RECENT FACULTY PUBLICLATONS

Polychlorinated biphenyl and polybrominated diphenyl ether profiles in serum from cattle, sheep, and goats across California
Sethi S, Chen X, Kass PH, Puschner B.
Chemosphere. 2017 Aug;181:63-73. doi: 10.1016/j.chemosphere.2017.04.059. Epub 2017 Apr 14.
http://www.sciencedirect.com/science/article/pii/S0045653517305957

Evolution of avian encephalomyelitis virus during embryo-adaptation
Hauck R, Sentíes-Cué CG, Wang Y, Kern C, Shivaprasad HL, Zhou H, Gallardo RA
PMID: 28532787 DOI: 10.1016/j.vetmic.2017.04.005
Vet Microbiol. 2017 May;204:1-7. doi: 10.1016/j.vetmic.2017.04.005. Epub 2017 Apr 9.

Amylases and Their Importance during Glycan Degradation: Genome Sequence Release of Salmonella Amylase Knockout Strains
Arabyan N, Huang BC, Weimer BC
PMID: 28522713 DOI: 10.1128/genomeA.00355-17
Genome Announc. 2017 May 18;5(20). pii: e00355-17. doi: 10.1128/genomeA.00355-17.

Impairment of antioxidant mechanisms in Japanese Medaka (Oryzias latipes) by acute exposure to aluminum
Ramírez-Duarte WF, Kurobe T, Teh SJ
PMID: 28529176 DOI: 10.1016/j.cbpc.2017.05.003
Comp Biochem Physiol C Toxicol Pharmacol. 2017 May 18. pii: S1532-0456(17)30107-2. doi: 10.1016/j.cbpc.2017.05.003.

Colostrum immunoglobulin G concentration of multiparous Jersey cows at first and second milking is associated with parity, colostrum yield, and time of first milking, and can be estimated with Brix refractometry
Silva-Del-Río N, Rolle D, García-Muñoz A, Rodríguez-Jiménez S, Valldecabres A, Lago A, Pandey P
PMID: 28478013 DOI: 10.3168/jds.2016-12394
J Dairy Sci. 2017 May 3. pii: S0022-0302(17)30383-1. doi: 10.3168/jds.2016-12394. [Epub ahead of print]

Outbreaks of bovine herpesvirus 2 infections in calves causing ear and facial skin lesions
Watanabe TTN, Moeller RB Jr, Crossley BM, Blanchard PC
PMID: 28423989 DOI: 10.1177/1040638717704480
J Vet Diagn Invest. 2017 Apr 1:1040638717704480. doi: 10.1177/1040638717704480. [Epub ahead of print]

The effect of diatomaceous earth in live, attenuated infectious bronchitis vaccine, immune responses, and protection against challenge
Nazmi A, Hauck R, Corbeil LB, Gallardo RA.
PMID: 28419351 DOI: 10.3382/ps/pex093
Poult Sci. 2017 Apr 17. doi: 10.3382/ps/pex093. [Epub ahead of print]

Whole-Genome Sequencing of Drug-Resistant Salmonella enterica Isolated from Dairy Cattle and Humans in New York and Washington States Reveals Source and Geographic Associations
Carroll LM, Wiedmann M, den Bakker H, Siler J, Warchocki S, Kent D, Lyalina S, Davis M, Sischo W, Besser T, Warnick LD, Pereira RV
PMID: 28389536 DOI: 10.1128/AEM.00140-17
Appl Environ Microbiol. 2017 Apr 7. pii: AEM.00140-17. doi: 10.1128/AEM.00140-17. [Epub ahead of print]