



Animal Agriculture Updates and Impacts December 2017

NEW LEADERS



Dr. John Angelos was recently appointed as director of the Center for Food Animal Health (CFAH). He also serves as chair of the department of medicine and epidemiology. A veterinary internist with expertise in livestock medicine and surgery, Angelos has a longstanding interest in understanding the pathogenesis and prevention of infectious bovine keratoconjunctivitis (IBK; 'pinkeye'). His extensive clinical experience and understanding of industry needs will be beneficial in guiding the future direction of CFAH. In this position, Angelos will assist the administration and faculty in securing resources for conducting research on animal diseases important to our livestock industries, important food- and vector-borne disease problems and zoonoses associated with diseases of livestock critical to the State of California, and sustaining the integrity of the production environment and surrounding ecosystem. Through commodity/industry advisory and scientific advisory committees he will foster collaborative research efforts between Agricultural Experiment Station (AES) and Cooperative Extension (CE) faculty and related UC programs.



Dr. Kent Pinkerton was recently appointed director for the UC Western Center for Agricultural Health and Safety (WCAHS). Pinkerton has served as the associate director of WCAHS for 15 years and is a principal investigator of a current WCAHS research project. He is a specialist in the respiratory, cardiovascular, and neurological effects of inhaled environmental air pollutants. He has conducted a number of studies in the California San Joaquin Valley to better understand how airborne particles in the agricultural setting contribute to the development of lung diseases, such as asthma and COPD. He is currently studying which agricultural practices pose the greatest risk to farmers and farmworkers from inhaling particulate matter. The goal is to establish effective strategies for farmers and workers to better understand their potential exposure to particulate matter and how best to manage it. Pinkerton is a professor of pediatrics at the UC Davis School of Medicine and professor of anatomy, physiology and cell biology in the School of Veterinary Medicine. He also serves as director of the Center for Health and the Environment and associate director of the Environmental Health Sciences Center, both located at UC Davis.

FACULTY RECRUITMENTS

- Professor of Clinical Microbiology-San Bernardino (CAHFS) – Kathy Toohey-Kurth recommended for appointment
- Professor of Clinical Anatomic Pathology-Tulare (CAHFS)
- Professor of Marine Aquaculture Science (VME)
- Assistant Professor of Epidemiology in Climate Adaptation Health (VME/SOM: PHS)
- Specialist in Cooperative Extension-Beef Cattle Herd Health and Production (PHR/Vet Ext)
- Specialist in Cooperative Extension-Dairy Cattle Production Health Management (PHR/Vet Ext)
- Specialist in Cooperative Extension in Antimicrobial Stewardship (Vet Ext/PHR)

VETERINARY MEDICAL CENTER – LEADING THE WAY – CAMPAIGN LAUNCH



On October 13, 2017, Chancellor Gary May and Dean Michael Lairmore announced plans to raise \$115 million in philanthropic support to update and improve three critical areas of the UC Davis Veterinary Medical Center: the Livestock and Field Service Center, the Equine Performance Center and the All-Species Imaging Center. This campaign, called “Leading the Way,” marks the first phase in a long-term plan to transform the UC Davis Veterinary Medical Center.

The veterinary teaching hospital is overdue for an update. Opened in 1970 to serve 3,000 patients per year, the hospital now sees more than 50,000 annually, causing the hospital to face significant constraints in space, layout and capacity, and impacting the speed at which clients receive care.

“It’s clear why patients are brought here. They receive the highest standard of compassionate care and benefit from the latest discoveries in veterinary medicine,” Chancellor Gary S. May said. “So let’s take some much-needed next steps, ones that ensure that UC Davis will continue to offer world-class care and an unbeatable education for students with a comprehensive veterinary medical center that builds on UC Davis’ strengths and reinforces our role as a world leader.”

The university has witnessed strong philanthropic interest in this campaign, having raised \$67 million — more than half of the campaign goal — prior to this afternoon’s announcement. Donors include grateful clients, alumni, faculty, staff and friends of the School of Veterinary Medicine and UC Davis.

The first phase will include:

- The **Livestock and Field Service Center** will become the first patient service area to come online and is an integral example of how progress at UC Davis and its commitment to animal agriculture will benefit California and the world. Upgrades and modifications will improve student and clinician safety and will also provide patients an optimal handling and care environment.
- To serve the equine industry, an important part of California’s economy and culture, the **Equine Performance Center** will transform equine services with a new arena and gait analysis capability for lameness evaluations. This exciting facility design includes state-of-the-art force-plate and video analysis rarely available in veterinary settings, opening a new avenue to improved performance through the application of clinical research.
- The **All Species Imaging Center**, pivotal to all hospital clinical specialties, will be centrally located to serve all patients, large and small. The strategic placement of the latest in imaging technology and expertise will expedite diagnosis and patient care, reduce stress and wait time for patients, and optimize operational efficiencies.

“Our vision will ensure access to the best options for veterinary care,” Dean Michael Lairmore said. “The Veterinary Medical Center will be unlike any in the world, one that combines compassionate health care for animals with innovations from across our university, a spirit of discovery and a passion for education that will transform veterinary medicine into the future.”



NEW SPACE FOR POULTRY RESEARCH



The school has recently completed a facility renovation to support poultry research. This laboratory contains two BSL-2 animal rooms with capacity for 500 birds, a temperature controlled environment, a storage room and a necropsy room. The space will consolidate research activities of the Poultry Medicine Program at UC Davis and will facilitate the ability of faculty to obtain funding and industry services.

The Poultry Medicine Program led by Dr. Rodrigo Gallardo researches endemic diseases of commercial poultry. Faculty work in parallel with the poultry industry in order to solve

current problems in a scientifically informed manner. Once research results are obtained, the faculty plan to disseminate information through a number of outreach activities to inform and prevent problems in the field. Some of the pathogens that they have been studying include: Infectious bronchitis virus, avian reoviruses, avian influenza, Newcastle disease virus, and infectious Coryza. They also perform basic research to understand the immune response to RNA viruses. Understanding immune responses will help investigators to design new preventative strategies to tackle problems that current strategies or vaccines have not been able to solve.

WILDFIRE VETERINARY RESPONSE FOR LIVESTOCK

On Monday, October 9th the veterinary hospital prepared for the animal care needs associated with the regional wildfire crisis. Beginning Tuesday, October 10th multiple field services and veterinary emergency response teams responded to requests for assistance and the hospital began receiving patients. The livestock teams responded as follows:



- October 11 - Livestock Herd Health (Field) Service sent one faculty veterinarian, two resident veterinarians and two students to the Solano County Fairgrounds.
- October 12 - Livestock Herd Health (Field) Service sent two faculty veterinarians to the Solano County Fairgrounds.
- October 13 - Livestock Herd Health (Field) Service sent two faculty veterinarians, one resident veterinarian and three students to the Napa High School Vintage Farm.
- October 14 - Livestock Medicine Service sent one faculty veterinarian to the Solano County Fairgrounds.
- October 16 - Livestock Herd Health (Field) Service sent one resident veterinarian to the Solano County Fairgrounds.

The hospital team has also treated 77 animals including: one dog, one goose one, one chicken, two llamas, 14 horses, 25 cats and 33 koi.



FOR AN ENDANGERED ANIMAL, A FIRE OR HURRICANE CAN MEAN THE END

When a wildfire swept through Arizona, all but 35 rare red squirrels disappeared. After California's fires and Hurricanes Harvey, Maria and Irma, so did other near-extinct animals. In Southern California, the mountain yellow-legged frog, of which there were about 400 living in remote, drying streams in the San Gabriel, San Bernardino and San Jacinto mountains, will face a hard winter after fires destroyed their habitat. Dr. Bruce Stein, a conservation scientist at the National Wildlife Federation, said he also worried for the California red-legged frog in wine country, as well as for endangered salmon and steelhead living in the Russian River (sediment flowing into the water could harm the fish).

One of North America's rarest species, the Amargosa vole, also lost part of its remaining habitat in a September fire in the Amargosa Basin near Tecopa, California. About 50 of the few hundred remaining mammals perished, said Janet Foley, a professor at the UC Davis, School of Veterinary Medicine. "It killed off all the vegetation which they need to live in that area."



HANDS-ON LEARNING AT THE RANCH

A group of two veterinarians and four students recently traveled to the Eden Valley Ranch to perform pregnancy checks on 94 cattle. This field visit presented a wonderful hands-on opportunity for students to gain real-life experience working with livestock.

The most efficient way to diagnose a pregnancy is to perform a manual palpation. Since the uterine wall sits against the rectum, the test is done transrectally, where the clinicians and students feel for certain indicators of a pregnancy. If a pregnancy is in an advanced stage, the easiest thing to palpate is the fetus itself. However, early pregnancies are determined by palpating the fremitus (uterine artery), which grows as the fetus ages. Another indicator is the placentome, which is where the fetal blood supply is attached. Using a combination of these techniques, pregnancy can be confirmed and accurately staged within about two weeks, starting after 30 days.



The students took turns performing the pregnancy examinations and administering vaccinations to the cattle. Each cow was vaccinated for respiratory and reproductive viruses, bacterial reproductive diseases, and clostridial diseases. Faculty member Bret McNabb and resident Muzafar Makhdoomi conferred with each student about their findings and confirmed with their own examinations. The group efficiently finished the entire herd in under four hours.

Throughout the examinations, McNabb and Makhdoomi continually asked the students questions about different aspects of herd health. Nearly every minute of interaction with the students was used as a teaching opportunity. The students were inquisitive and eager to learn.

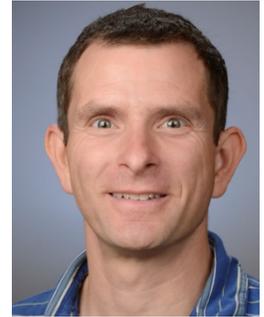
In addition, the students examined the overall health of the herd, noticing the flesh tone, body position, and coat appearance. Also checked were their feet, legs and eyes. As each cow exited the chute, its gait was analyzed for lameness issues. Based on all of these observations, the herd was deemed in good health, and displayed no signs of systemic illness.

HOW SAFE IS CHICKEN IMPORTED FROM CHINA? 5 QUESTIONS ANSWERED

Excerpt from “The Conversation” publication: Maurice Pitesky, a poultry extension specialist at the University of California, Davis School of Veterinary Medicine with a focus on poultry health and food safety epidemiology, answers five questions about importing Chinese chicken.

Why is the United States importing chicken from China? Do we have a shortage?

Hardly. The U.S. is the largest poultry producer in the world, and the second-largest poultry exporter after Brazil. However, as part of a recent bilateral trade deal, China has agreed to accept imports of beef and liquefied natural gas from the U.S. In exchange, China is allowed to export cooked poultry meat to the U.S.



Why can China send us only cooked chicken?

This is most likely in response to concerns over avian influenza transmission from raw poultry to the U.S. Avian influenza viruses could potentially infect U.S. poultry or birds and spread these novel viruses in North America. Some of these viruses can infect humans. South and Southeast Asia have dense human populations, with numerous poultry producers, vendors and markets where people are exposed to live birds – all conditions that contribute to the spread of avian flu. Since 2013 China has confirmed 1,557 human cases of AH7N9 flu and 370 deaths.

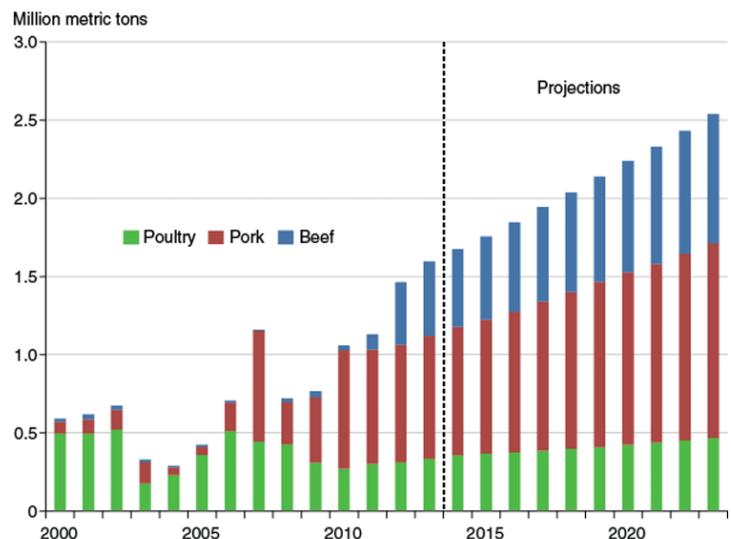


Given China’s history of food safety problems, should U.S. consumers be worried about eating chicken processed there?

China is already the third leading supplier of food and agricultural imports to the United States. U.S. consumers are eating imported Chinese fish, shellfish, juices, canned fruits and vegetables. If poultry is cooked properly, there is no food safety risk from viruses or bacteria. However, if the poultry is not cooked properly, or if there is some type of cross-contamination – for example, if raw chicken or feathers come into contact with cooked product or packaging material – then

zoonotic bacteria like salmonella and campylobacter can cross the species barrier and sicken humans. Poultry meat can also contain contaminants, such as heavy metals, and antibiotic residues if birds are treated with antibiotics in an inappropriate fashion. If poultry farmers use antibiotics inappropriately (quantity, type and timing), residues can persist in muscle, organs and eggs and toxic and harmful residues build up in the birds. These risks are probably greater for poultry raised and processed in China than for poultry raised and processed in the U.S. Here there are strict rules requiring growers to stop giving birds antibiotics for periods of days or weeks before they are processed, and we have a National Residue Program that is designed to test for these compounds in eggs and meat. Heavy metals in Chinese poultry products may also be an issue. This is a worldwide concern, but it’s especially serious in China because they still burn huge quantities of coal, which releases lead, mercury, cadmium and arsenic. High levels of lead and cadmium have been reported in agricultural areas near Chinese coal mines. These heavy metals can contaminate soil and end up in animal feed and animal meat and eggs. Without publically available data, we really don’t understand how widespread these problems are in China.

China’s global meat imports projected to continue upward trend



Source: USDA Production, Supply and Distribution database and projections.

What will U.S. inspectors do to determine whether Chinese chicken is safe?

The U.S. Department of Agriculture's Food Safety Inspection Service (FSIS) is responsible for determining whether other countries have meat and poultry safeguards that are equivalent to ours. Chinese poultry processing plants cannot ship cooked poultry to the U.S. unless they meet that test.

Where will chicken processed in China show up in U.S. markets?

Cooked poultry is considered to be a processed food item, so it is excluded from country of origin labeling requirements which would apply to raw chicken. This means that U.S. consumers will not know they are consuming chicken grown and processed in China. While a trade deal was signed, at this point Chinese cooked poultry is still not approved for import to the U.S. until FSIS approval is granted on a pending rule. The recent import of cooked poultry from China to the U.S. was only a test, and the cooked product was not for sale.

If China can sell cooked poultry at a competitive price point, there will most likely be a U.S. market for it. At this point, though, the Chinese poultry industry is not as integrated or technologically advanced as the U.S. poultry industry, which makes it difficult for China to compete with the U.S. poultry industry.

MASTERS OF PREVENTIVE VETERINARY MEDICINE GRADS CELEBRATE 50 YEARS OF GLOBAL IMPACTS



More than 100 alumni and faculty gathered to celebrate the 50th Anniversary of the Masters in Preventive Veterinary Medicine (MPVM) program in early September. The MPVM program, established in 1967, has graduated more than 1,000 trained veterinary professionals to investigate and evaluate disease and production problems in animal populations and to design and implement disease control programs. From the beginning MPVM grads have held top-level governmental, private industry, academic and practice positions in the U.S. and 86 other countries, effectively impacting and improving animal and human health on a global level.

The day's festivities included a keynote address by Dr. Marguerite Pappaioanou, an epidemiologist and veterinarian with over 30 years' experience working toward improving global and U.S. public health, most recently as CDC's Liaison to FDA for Food Safety. Participants also heard from Dr. Stephanie Ostrowski this year's Robert Dyar Labrador Memorial Lectureship in Epidemiology. Ostrowski served in the U.S. Public Health Service as a Commissioned Officer (Veterinary Category), achieving the rank of Captain following 20 years of service.

"This event was a testament to the value of the MPVM educational training and the worldwide impact of its graduates," said Ashley Hill, current MPVM program director.

CALIFORNIA ANIMAL HEALTH AND FOOD SAFETY LAB SYSTEM

Highlights from the most recent CAHFS Connection monthly electronic publication identified the following diagnostic results:

BOVINE:

- **Clostridial hepatitis** was the cause of abdominal pain in a 6-month-old Holstein heifer.
- **Brucella abortus RB51** vaccine strain was the cause of bronchopneumonia and abortion in a 6- to 7-month gestation fetus from a 2-year-old beef heifer that had been vaccinated with RB51 while pregnant.

SMALL RUMINANTS:

- **Haemonchosis and coccidiosis** were the cause of anemia, hypoproteinemia and diarrhea in 6-month-old lambs on irrigated pasture in a flock of 430 lambs from which 27 had died in 10 days.

PORCINE:

- **Pneumonia due to porcine circovirus type 2 (PCV-2) and porcine respiratory and reproductive (PRRS) virus** was diagnosed in a 10-week-old pig that was found dead without clinical signs being observed.



POULTRY AND OTHER AVIAN:

- **Escherichia coli and Ornithobacterium rhinotracheale** co-infection was responsible for cough, ocular and nasal discharge, depression, reluctance to move and increased mortality from an average of 5 to 44 birds per day, in 11.5-week-old tom turkeys of a 6,000-bird flock.
- **Ascites syndrome** was diagnosed in a flock of 3,000, 20-day-old broiler chicks.
- **Erysipelas septicemia** was diagnosed in two, 14-month-old geese from a commercial flock experiencing increased mortality.

CAHFS Connection is available at: http://www.vetmed.ucdavis.edu/cahfs/news_disease_info/index.cfm

LEADERSHIP TRAINING INSPIRES LARGE ANIMAL CLINIC



Twenty faculty and staff members of the veterinary hospital's Large Animal Clinic recently completed a leadership training seminar to maximize efficiency and morale among the team. The Zoetis PeopleFirst™ Leadership Certificate Program covered four 2-day sessions spread out over seven months for a total of 70 hours. Those who participated received continuing education credit for their achievement.

The program covered learning points such as: employee engagement, learning styles, effective communication, active listening and time management. The lessons were enhanced by group discussions, brainstorming and newfound awareness of similar and different challenges. An overwhelming consensus from the training was an eagerness to share this exercise with other members of the team and begin implementing the outcomes such as:

- **Increasing employee engagement** – which leads to more opportunities to excel and optimize efficiency, and enriched patient care and client experiences. A takeaway to engage the rest of the hospital was to foster a collaborative, productive and harmonious working environment that supports a cohesive team.

- *Understanding different learning styles* - was another pathway to a better team performance. Some people learn by seeing an activity performed, while some find it best to read or hear about the activity. For others, it's learning how to do something by being hands-on. Realizing that there isn't a "one size fits all" learning process, and adapting to different styles can ultimately lead a large group to the same end point.
- *Encouraging team members* – throughout the hospital participants are sharing strategies for new approaches to the everyday work environment. Faculty and staff supervisors are influencing the working climate and boosting morale by focusing on the entire team's wellbeing and the concept of "everyone contributes and everyone matters."

FLY LARVAE ARE GOOD FOR CHICKENS, BUT HOW DO THEY AFFECT YOUR ORGANIC EGGS?

If you've ever raised chickens, you know they like to eat bugs. But does the amount of insects included in their diet have an effect on the eggs they produce? That's the question researchers at the Pastured Poultry Project have set out to answer. Their project seeks to determine if feeding hens a diet supplemented with black soldier fly larvae will cause their eggs to taste or look different.

Currently, farmers are allowed to add synthetic methionine, a synthetic amino acid, to organic poultry feed to improve the birds' health and egg production. But the National Organic Standards Board (a federal advisory board) has expressed their desire to phase out synthetic methionine from organic poultry feed. The fly larvae are a natural source of methionine — an important nutrient for chickens. But other natural replacements haven't worked out so well. Adding fishmeal to feed has been widely studied, but in North America, when used at the levels needed to balance the dietary amino acids, fishmeal is cost-prohibitive and imparts a fishy taste to the meat and eggs.



Students participate in egg tasting event at UC Davis. (Evet Kilmartin/UCANR)

Researchers will have consumers taste test eggs from chickens that have received feed containing 20 percent, 15 percent, 10 percent and 5 percent black soldier fly larvae to see if it affects the eating experience.

The larvae are produced in Professor Jean VanderGheynst's lab on campus and also purchased from commercial sources. The larvae are processed, dried and ground into the chicken feed. The project may lead to improved poultry health while reducing the amount of corn and soy used in chicken feed. The corn and soy saved could be diverted for other uses, including biofuels and additional calories for humans.

The collaborative project is led by Maurice Pitesky, UC Cooperative Extension poultry specialist with the UC Davis School of Veterinary Medicine and UC Agriculture and Natural Resources; Deb Niemeier, professor from the Department of Civil and Environmental Engineering; and Jean VanderGheynst, professor in the Department of Biological Agricultural Engineering. It also involves UC Davis Dining Services, Animal Science, School of Veterinary Medicine, Bio-Ag Engineering, Civil Engineering, graduate student Lydia Palma and approximately 10 animal science and engineering undergraduate students. The experiment is being supported by the Methionine Task Force, which represents organic poultry producers across the U.S.

FIVE YEARS OF DROUGHT AND DECADES OF HABITAT LOSS COULD BE IMPACTING DEER AND THEIR PREDATORS

The California Department of Fish and Wildlife (CDFW) estimates that since 1999 the deer population has dropped by more than 300,000, according to its annual estimates.

In the hills north of Highway 166 in Los Padres National Forest no deer tracks around a make shift watering station in an area where there's no water for miles begs the question "where are they?" Usually this area in early October, mating season, shows signs of deer, sheep and other ruminants. The drought has scorched available food and water for half a decade, and rapid, consistent human development is constantly pushing deer and their predators (mountain lions) out of their traditional habitats, which reduces their population range and weakens their ability to evade predators.



In 1990, California passed Proposition 117, which made mountain lions a "specially protected species," and illegal to hunt. The legislation came about due to fears that the animal was on the path to extinction. This has created conditions that allow the big cats to feast on deer unchecked. That could be significant in the Los Padres National Forest, which encompasses nearly 3,000 square miles and stretches from Ventura to Monterey counties.

"Although deer populations in the state have declined overall in the last 30 years, there is tremendous variation year to year and zone to zone," said Winston Vickers, an associate veterinarian at the Wildlife Health Center at UC Davis and the co-principal investigator of the Southern California Mountain Lion Project. "Humans have the largest impact on animal populations. I think

most people at the CDFW would agree that habitat loss and fragmentation are clearly the biggest issues for both deer and mountain lions at the population level, as with many other wildlife species, in California versus predation," he said.

Currently, there are an estimated 4,000 to 6,000 mountain lions living in California. Vickers and other experts are much more concerned about the downward trend in population of the Southern Californian mountain lion over the past few decades than they are about deer populations. Researchers track the great cats through a combination of radio collared monitoring and genetic analyses taken from samples when the animals are captured before being released back into the wild. In a research paper Vickers co-authored with scientists from UC Davis, The Nature Conservancy in San Francisco, and the CDFW, the writers note that despite protection from hunting, the survival rate for radio collared mountain lions was "surprisingly low (55.8 percent), and humans caused the majority of puma [lion] deaths." The most common source of mortality was vehicle collisions.

DIVERS REMOVE 30-YEAR-OLD JUNK REEF FROM NEWPORT BEACH, CALIFORNIA

Until recently, divers at Newport Beach, California, likely noticed an odd spectacle of 1,500 old tires and a dizzying tangle of plastic. The decrepit site was actually the idea of the now deceased Rodolphe Streichenberger, president of the Marine Forests Society, a group that is no longer active. In 1988, Streichenberger created this controversial artificial reef that he believed would help the marine ecosystem, grow mussels for commercial sale, and lead to other benefits for the ocean.



Streichenberger's research proved to be misguided. Although not understood at the time, we now know of the horrible effects plastic has on the ocean and marine life. "He failed to ensure the protection of the marine environment and without the necessary permits, built the 10-acre project with 1,500 half-buried tires, 2,000 plastic jugs and 100 20-foot PVC pipes along the ocean floor," explained a press release from the California Coastal Commission issued on Wednesday, October 18th. "State scientists said the tires contained harmful toxins, the material was not dense enough to anchor to the ocean floor and warned the discarded netting and ropes could trap fish and marine mammals."

Now, nearly 30 years after its initial creation, the California Coastal Commission is working hard to dismantle the dump. In partnership with the school's [Karen C. Drayer Wildlife Health Center](#), divers began removing tires from the water the week of October 9th. The team averaged more than 100 tires a day.



"It's about time this was cleaned up. Dumping plastic and other trash into our oceans is not the way to restore the marine ecosystem," said California Coastal Commission Chair Dayna Bochco in the same press release. "There is an estimated 18 billion pounds of plastic that enters the world's oceans every year and we must do what we can to clean this up."

Indeed, the site is a far cry from the kelp forests Streichenberger envisioned. Instead, the California Coastal Commission found that the tires were enveloped in the "type of marine life commonly found on pier pilings and boat bottoms." Additionally, the ocean's currents had spread the jumble of PVC pipes, netting, and concrete slabs arbitrarily around the ocean floor. "There's no native kelp, just a few fish swimming around, reports Kirsten Gilardi, assistant director at the Wildlife Health Center at UC Davis. "It's nothing like the diversity and density you'd see on a natural rocky reef off the Southern California coast."

RECENT FACULTY PUBLICATIONS

- [Brucella Infection in Asian Sea Otters \(*Enhydra lutris*\) on Bering Island, Russia](#)
Burgess TL, Johnson CK, Burdin A, Gill VA, Doroff AM, Tuomi P, Smith WA, Goldstein T.
PMID: 28715292 - DOI: [10.7589/2016-09-220](#)
- [Environmentally relevant concentrations of herbicides impact non-target species at multiple sublethal endpoints](#)
Hasenbein S, Peralta J, Lawler SP, Connon RE.
PMID: 28711003 - DOI: [10.1016/j.scitotenv.2017.06.270](#)
- [Susceptibility of Salmonella Biofilm and Planktonic Bacteria to Common Disinfectant Agents Used in Poultry Processing](#)
Chylkova T, Cadena M, Ferreiro A, Pitesky M.
PMID: 28561639 - DOI: [10.4315/0362-028X.JFP-16-393](#)
- [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](#)
- [A review of potential bluetongue virus vaccine strategies](#)
Mayo C, Lee J, Kopanke J, MacLachlan NJ.
PMID: 28377132 - DOI: [10.1016/j.vetmic.2017.03.015](#)