



AGRICULTURAL AND NATURAL RESOURCES

Update and Impacts

May 2017

#1 IN QS WORLD UNIVERSITY RANKINGS FOR VETERINARY SCIENCE

The UC Davis School of Veterinary Medicine was once again recognized with the top spot in veterinary science in the latest QS World University Rankings (March 2017). First in veterinary science since the field was added to the rankings in 2015, UC Davis is renowned for applying a “One Health” approach to addressing critical health concerns on a local and global scale.



“The energy, passion, knowledge and skills that the UC Davis veterinary medicine community brings to their jobs every day is the secret to our success,” said Michael Lairmore, the school's dean since 2011. “Our future, supported in part by generous philanthropic partners, will be shaped by our combined efforts as we push the boundaries of research discoveries, provide innovative educational opportunities for our students, bring advanced clinical services to our animal patients, and serve our communities by advancing the health of animals, people and the environment.”

FACULTY RECRUITMENTS IN PROGRESS

- Professor of Clinical Microbiology-San Bernardino
- Professor of Clinical Avian Diagnostics-Turlock
- Professor of Clinical Pathology-Tulare
- Large Animal Clinic Director
- Specialist in Cooperative Extension-Beef Cattle Herd Health and Production
- Specialist in Cooperative Extension-Dairy Cattle Production Health Management
- Developing search - Specialist in Cooperative Extension in Antimicrobial Stewardship (Vet Ext/PHR)

NEW LEADERS

Dr. Jenna Burton was recently appointed Associate Director of the Veterinary Center for Clinical Trials (VCCT). She has extensive experience in the design and implementation of veterinary clinical trials. As Associate Director, in coordination with VCCT Director Erik Wisner, Burton will provide leadership and administrative oversight of the VCCT, develop and refine strategic and business plans and help identify clinical trials opportunities.



Burton received her DVM from The Ohio State University (2006), and an MS from Colorado State University (2011). Board certified in medical oncology by the American College of Veterinary Internal Medicine, she was an Assistant Professor and Oncology Clinical Trials Coordinator at CSU before joining our faculty in 2014. Her research interests include comparative and translational oncology.



Dr. Jodi Westropp was recently appointed Director for Veterinary Medical Continuing Education. As a member of the faculty since 2003, she will be responsible for working with faculty to develop and coordinate continuing education programs designed to meet the needs of veterinarians in California, and throughout the Western U.S. Another important responsibility will be developing and testing the effectiveness of continuing education using distance methodologies and evaluation of this mode of continuing education to see how it can meet the needs of the veterinary community, both nationally and internationally. Westropp received her DVM (1997) and PhD (2004) from The Ohio State University. She is a Diplomate of the American College of Veterinary Internal Medicine.

VETERINARY MEDICINE TEACHING AND RESEARCH CENTER (VMTRC), TULARE

The VMTRC hosted its annual booth at the [World Ag Expo](#) in Tulare this past February. This is the largest agriculture equipment show in the world with more than 100,000 visitors and 1,500 exhibitors, and showcases the latest innovations and trends in farm equipment, communications and technology on 2.6 million square feet of exhibit space. During the three-day show, attendees visiting the booth learn about the center's important role in training veterinary students and residents in dairy production medicine, and in conducting research and services to solve problems related to dairy production medicine, food safety, cattle welfare and ecosystem health.



BEGINNING FARMER AND RANCHER DEVELOPMENT PROGRAM – USDA GRANT



Maurice Pitesky, Cooperative Extension Poultry Specialist, will receive a \$600,000 3-year Beginning Farmer and Rancher Development Program – USDA grant for his proposal titled “Free-Range and Pastured Poultry Training and Outreach Innovation Hub for Beginning Farmers in California and Oregon.” Embargoed until USDA makes official announcement, the grant is scheduled to commence this August.

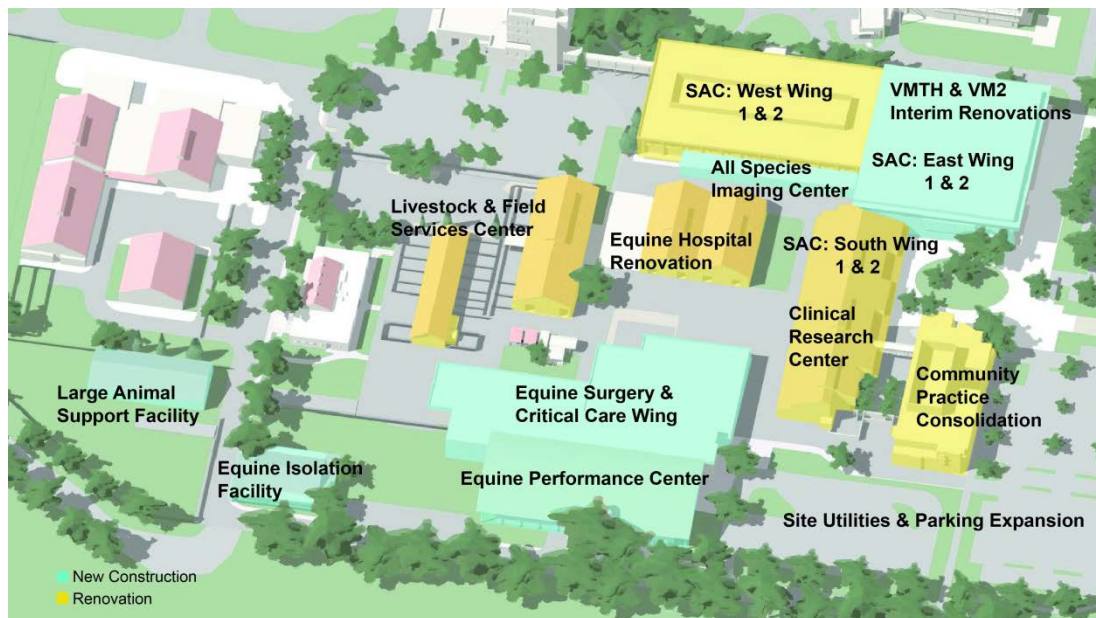
In California there are a total of 816 commercial poultry producers with less than 3,000 laying hens (CDFA, 2016). While these facilities only account for less than 2% of the laying hens in California, the majority of these farms raise poultry in free-range and pastured environments which have inherent biosecurity risks among other challenges. There are currently few resources available to this growing segment of commercial poultry production. The goal of this project is to leverage the UC Davis Pastured Poultry Farm to act as a training hub to facilitate the growing number of beginning free-range and pastured poultry farmers in California and Oregon. Based on an initial needs assessment, areas of training and education will include:

- Biosecurity, husbandry and land management practices
- Housing, equipment and predator management
- Food safety
- Environmental management
- Business management and marketing

VETERINARY MEDICAL CENTER – LEADING THE WAY

The future Veterinary Medical Center (VMC) will be built to promote clinical innovation, transformational discovery and compassionate healing; each animal and client will receive attentive and personalized care in the center of a world-leading biomedical research hub. Our veterinary scientists uniquely contribute to each patient's outcome as they push the envelope to advance care by setting new standards for veterinary medicine. The planning effort for the future VMC has identified ten project groupings:

- Large Animal Support Facility
- Equine Performance Center
- All-Species Imaging Center
- Small Animal Clinic Examination Rooms
- Livestock and Field Service Center
- Small Animal Hospital East Wing
- Small Animal Hospital West Wing
- Community Practice Consolidation
- Equine Surgery and Critical Care Center
- Equine Isolation Facility



Each of these projects advances the school's ability to handle the challenging and increasing caseload, allows for the adoption of the latest technology in veterinary medicine and provides the infrastructure and efficient services to facilitate clinical research. Each stage of construction not only eases overcrowding with an enlarged footprint, but also enhances the integrated approach of the veterinary teams to deliver patient care, teach and develop new knowledge—applying basic science discoveries to the clinical setting for added patient benefit and student education.

Large Animal Support Facility

Today's agriculture is increasingly global. As the world population grows, so does the demand for safe and quality animal proteins. The emerging food animal health issues facing a university of the 21st century require us to prepare our veterinary students



to enhance the productivity of animal agriculture, improve animal health, animal welfare and promote public health. The Large Animal Support Facility project is the first project in this coordinated masterplan.

Partners in Livestock Health

Today's agriculture is increasingly global. As the world population grows, so does the demand for safe and quality animal proteins. The emerging food animal health issues facing a university of the 21st century require us to prepare our veterinary students to enhance the productivity of animal agriculture, improve animal health, animal welfare and promote public health.

Veterinary Medicine Teaching and Research Center

Educating and training the next generation of veterinarians by offering on-farm clinical medicine training and residencies in dairy production medicine; finding solutions to enhance cow health and promote productive cattle herds

UC Davis Veterinary Hospital

Providing livestock care to maintain healthy animals, enhance animal well-being, train DVM students and residents, and promote cutting-edge clinical research

California Animal Health and Food Safety Laboratory System

Protecting the health of livestock and poultry, and safeguarding public health, through rapid and reliable diagnoses of animal diseases, including those affecting humans

Center for Animal Disease Modeling and Surveillance

Developing modeling systems that can be used to prevent, control, or eradicate animal diseases and their associated adverse economic impacts

Center for Food Animal Health

Advancing livestock, public and environmental health through a competitive research grant program

Western Institute for Food Safety and Security

Providing research, biosecurity and food safety training, and outreach programs for global food safety and defense in all sectors of the food system; environment to consumer



Food Animal Drug Residue Avoidance Database

Providing science-based expert advice to help mitigate unsafe chemical residues in products derived from food animals

State and Federal Food and Agriculture Agencies

Collaborating with state & federal (CDFA/USDA) agency professionals to assure the safety, availability and affordability of agricultural products; protecting public and animal health while enhancing stewardship of the environment

UC Agricultural and Natural Resources/Cooperative Extension

Serving California and beyond, faculty and veterinary specialists conduct research, and outreach activities to promote animal agriculture

Animal Agriculture Stakeholders

Partnering with livestock producers, referring veterinarians, campus colleagues and allied industries to support healthy, safe and nutritious animal-based food products; driving research, ongoing animal health surveillance, and policy development related to a safe and secure food supply

PROTECTING POULTRY FROM AVIAN INFLUENZA

UC poultry experts are urging poultry owners to examine biosecurity for their flocks after avian influenza was confirmed in commercial chickens in Tennessee by the USDA Animal and Plant Health Inspection Service on March 5th. To protect the birds' health, UC scientists recommend taking measures to prevent poultry from coming into contact with wild birds.

"Based on the initial sequence of the virus, the source of the virus is thought to be waterfowl, said Maurice Pitesky, Cooperative Extension Poultry Specialist. "This is consistent with the current understanding of how avian influenza spreads and evolves. Specifically, juveniles are infected at breeding locations and travel south in the fall carrying virus. As the waterfowl move southward, they are more likely to interact with other species, increasing the risk of interspecies transmission and formation of new varieties of avian influenza."

The case in Lincoln County, Tenn., was the first report of highly pathogenic H7 avian influenza in commercial poultry in the U.S. this year. The flock of 73,500 affected chickens is located within the Mississippi Flyway, one of four North American flyways for migratory birds.



"Lincoln County is located in one of the medium-high risk areas that were identified by our risk map, said Beatriz Martínez López, director of the Center for Animal Disease Modeling and Surveillance in the school.

"We need to increase awareness of poultry producers to maximize the biosecurity implemented in their operations, particularly in those located in high-risk areas, mainly farms that are in close proximity to wetlands or other wild bird feeding and resting areas," said Martínez López.

Poultry owners can identify biosecurity strengths and weaknesses for their own farm or backyard flock by filling out a free survey designed by Martínez López and other poultry experts. People who raise chickens, quail, ducks, turkeys, geese or other birds anywhere in the United States are invited to use the resource. At the end of the survey, participants receive specific research-based recommendations of biosecurity measures they can apply on their own types of farms. The poultry biosecurity survey is available in English <http://bit.ly/2kkMycf> and Spanish <http://bit.ly/2mjO13G>. The survey takes 15 to 20 minutes to complete and will be open until June 1.

Owners of backyard chickens who observe illness or increased mortality among their birds should call their veterinarian or the California Department of Food Agriculture sick bird hotline at (866) 922-BIRD (2473).

ARE GENETICALLY ALTERED MOSQUITOS THE BEST WAY TO COMBAT MALARIA?



Scientists have used genetics to alter mosquito populations for several decades, to try to eliminate diseases such as malaria and more recently Zika. But these efforts — when they've worked at all — have only partially addressed the problem.

Now, scientists want to use a powerful new technology with the potential to change or wipe out an entire species of mosquito. The key tool is something called a "gene drive." These alter genes so that, when the insects reproduce, they actually change the entire gene pool. In some cases, gene drives could successfully eliminate a species. This is one of the approaches being prepared by scientists in a small village in Burkina Faso called Bana, a place where malaria is a huge problem.

"A gene drive takes advantage of the chemistry in the cell so that all of the offspring from a parent carrying that copy will inherit that gene," says Professor Gregory Lanzaro, director of the Mosquito Research Laboratory at the School of Veterinary Medicine. "So, it allows us to introduce genetic material into a wild population and have the frequency of that material approach 100 percent."

But, releasing a gene drive into the wild has never been done before. What could go wrong with this untested approach? And what might be the domino effects of eliminating entire species, even if they're pesky insects? Those are still big, open questions. There are environmentalists and researchers who are worried about the risks. Last year, a ban on gene drives was proposed at a United Nations biodiversity convention, but governments largely rejected the idea. Environmental groups such as Greenpeace and GeneWatch plan to continue to challenge the use of gene drives in the wild and to propose greater regulation of the technology.

Lanzaro, who does genetic experiments on mosquitos in Africa in an effort to combat malaria, says the research happening in Burkina Faso does have its risks — but he contends they are probably minimal.

DR. JOHN M. ADASKA RECEIVES 2016 AAVLD E.P. POPE AWARD

Congratulations to Dr. John Adaska (DVM, MPVM, Ph.D., DACVP), recipient of the American Association of Veterinary Laboratory Diagnosticians' (AAVLD) E. P. Pope Award. The Pope Award is the highest honor given by the association in recognition of an individual who has made noteworthy and significant contributions to advance the recognition of the specialty of veterinary diagnostic laboratory medicine.



Adaska was honored at the AAVLD's President's Dinner Ceremony this fall for his contributions as "a consummate diagnostician, a scientist, a teacher, an advocate, a trainer and mentor, and a huge supporter of the AAVLD." He was recognized for: service oriented approach; thoughtful, professional, and effective advocate activities in support of the AAVLD; instrumental oversight of the association's finances during a time of significant change and leadership transitions; and his successful advocacy efforts related to an initiative for the National Animal Health Laboratory Network. Adaska has also served on a number of AAVLD committees, most recently as the Secretary/Treasurer on the Association's Executive Committee.

As newly appointed chief of the California Animal Health and Food Safety Laboratory System's (CAHFS) Tulare Branch, Adaska has served veterinarians, dairy farmers, and animal health stakeholders for more than 20 years. The Tulare facility is one of four laboratories within CAHFS, headquartered at UC Davis and operated for the state by the School of Veterinary Medicine to protect animal health and performance, and safeguard public health and the food supply.

CAHFS CONNECTION

Highlights from the [April CAHFS Connection](#) e-newsletter:

Bovine: Bronchopneumonia caused several deaths in a group of 3-month-old beef steers.

Small Ruminants: Late-term abortions occurred in two age groups of ewes on a single property. An aborted fetus submitted from the older ewe group had placentitis, fetal pneumonia and conjunctivitis from which *Mannheimia haemolytica* was isolated. An abortion from a yearling ewe group had similar lesions, but *Chlamydia spp.* was identified in the placenta.

Porcine: Splenic rupture due to leukemia-induced splenomegaly was the cause of death in a 3-month-old Hampshire pig that was found dead 10 days after being purchased.

Poultry and Other Avian: Ascaridiasis was found in one adult and one juvenile racing pigeon submitted from a flock of approximately 20 birds with history of weight loss of 2-week-duration.

WESTERN INSTITUTE FOR FOOD SAFETY AND SECURITY (WIFSS)

Disasters that impact rural communities pose a significant risk to animals, agriculture, and the U.S. food supply. Rural regions with a high concentration of animals and agriculture tend to have fewer resources to draw upon when natural or accidental disasters strike. Furthermore, these regions are vulnerable to intentional agroterrorism attacks. Preparedness is essential for the coordination of an effective all-hazards disaster response. To address this need, WIFSS has developed two training courses for rural communities. The target audiences for these courses includes local emergency response teams, emergency planners, veterinarians, animal control officials, government and on-government agencies, and tribal representatives.



The first course is designed to provide participants with tools to prepare for, respond to and recover from disasters involving animals in rural communities including: safe handling, animal evacuation, animal sheltering, humane euthanasia and carcass disposal. The second course will provide emergency planning groups with the background information need to develop animal, agricultural and food related disaster response plans that could be included within the existing Emergency Operation Plan. This course includes incidents that would require federal agency response, such as foreign/infectious animal disease outbreaks or agroterrorism.

This project was funded by a cooperative agreement with the Rural Domestic Preparedness Consortium which is funded through a Department of Homeland Security training grant.

NEW VETERINARY CLASS OF 2021

The school is pleased to welcome the incoming veterinary students for fall, the Class of 2021, which includes 122 California residents, 20 non-residents, 2 WICHE residents, and 1 student from China. The class is made up of 115 females and 30 males for a total class size of 145 students, selected from a pool of 1040 completed applications. The average science GPA is 3.74. The class age ranges from 20-38, with an average age of 22. Forty-three percent of the class lists diverse or multi-ethnic backgrounds—UC Davis consistently ranks among the top three veterinary schools in student diversity. The students have indicated career interests in academic/research/teaching (23), public health (7) and private practice or specialty practice (115).



VETERINARY MEDICINE STUDENT SERVICES AND ADMINISTRATION CENTER GRAND OPENING

The new facility Grand Opening was a huge success with more than 250 attendees. The program included formal remarks by campus and school leaders, followed by tours and reception festivities. The center houses 100 staff and school leaders dedicated to providing a range of services and support for the school's community. This facility is a major piece of the school's overall masterplan designed to co-locate the teaching, research, clinical and administrative functions at the Health Sciences District in modern, state-of-the-art buildings. It serves as a gateway to the veterinary medical campus and future home of the Veterinary Medical Center.



CENTER FOR DISEASE CONTROL (CDC) VETERINARY STUDENT DAY

Ten UC Davis veterinary students and faculty mentors Ashely Hill and Janet Foley joined hundreds of veterinary students and faculty from across the country at CDC Veterinary Student Day. Organized by the CDC's National Center for Emerging and Infectious Zoonotic Diseases, the event's theme was "The Secret Life of Vets and Pets." The bi-annual conference focuses on the critical role veterinary medicine plays in global public health and encourages student interest in veterinary public practice careers.

"Visiting CDC was like a trip to Disneyland for nerds," said Kim Conway, Class of 2018. "We talked with Dr. Robyn Stoddard (UC Davis '00) and heard firsthand about her challenges responding to the Ebola outbreak." CDC Acting Director Dr. Anne Schuchat kicked off the event which featured a number of presentations that showcased epidemiology and science in action, public health challenges, emerging zoonotic disease threats and control strategies, and the value of the One Health approach. Topics included Ebola, Rabies, MERS, E.coli 0157 and Rocky Mountain Spotted Fever. A "Meet the Public Health Experts" panel featured professionals from several federal agencies (CDC, USDA FSIS, USDA-APHIS, FDA) and veterinary associations (AAVMC, AVMA and NASPHV).

"The most inspirational part of the trip was meeting with UC Davis alumni," said Lynae Shubin, Class of 2019. "I was so impressed with their success and it was incredible to think that they were once exactly where I am now."



Students had the opportunity to network, making valuable contacts with veterinarians already working at the CDC. One of the highlights for the team was hearing the different career and education paths that veterinarians in public health careers had taken to get to their current positions and the variety of career opportunities -- from laboratory work to outbreak response.

WASTEWATER TREATMENT PLANTS ADD RISK FOR ORCAS

Orcas in the Pacific Northwest are already stressed from pollution, noise from vessel traffic and lack of food because of declining salmon runs. In the first study of its kind, scientists have now identified a fourth risk factor: pathogens that could hurt the endangered Southern Resident Killer Whale population — possibly from human sewage.

Reduced to 78 animals, the orcas are in an uphill battle for survival. In research over four years, scientists found yet another reason why, detected in their exhaled breath.



In their paper published in Nature's Scientific Reports, scientists detailed their research using petri dishes extended on 25-foot-long poles to capture samples of orcas' breath as they came to the surface in the wild and exhaled. The whales exchange as much as 85 percent of their lung capacity when they come to the surface to breathe, so the dishes got a blast direct from the microbiome within the creatures' lungs.

What scientists discovered in 26 samples from orcas around the San Juan Islands was a bevy of microbes that they analyzed and screened for antibiotic resistance. They were looking for evidence of human activity and in particular waste seepage into the marine environment. That's important because the pathogens can sicken both orcas and people. One possible source of the pathogens is human sewage.

"It is noteworthy that within 30 miles of the study area the city of Victoria, B.C., does not have a secondary sewage treatment facility, and instead discharges primary treatment product from the resident population of approximately 360,000 to the Salish Sea," the scientists wrote. "A correlation may exist between the lack of secondary treatment for sewage entering the Salish Sea and the presence of antibiotic resistant bacteria within ... breath samples."

Secondary sewage treatment kills many more pathogens in sewage, and while it is planned for Victoria, the controversy over its lack has raged for decades in Cascadia. The Capital Regional District of southern Vancouver Island now is launching work on a state-of-the-art plant to be completed by 2020.

"The study shows how linked people are to the water and the animals in it, something that can be easy to forget," said Joe Gaydos of the SeaDoc Society part of the school's One Health Institute.

POULTRY STUDIES SUPPORTING ORGANIC POULTRY PRODUCERS



The current USDA organic standards for poultry only allow up to two pounds of synthetic methionine per ton of feed for laying hens and broilers. Without enough methionine in organic commercial poultry diets, hens are prone to suboptimal egg production, egg size, decreased growth and diminished immunity. Consequently, there is interest in alternative feed sources rich in methionine that can be added to organic poultry diets. Maurice Pitesky, Cooperative Extension Poultry Specialist, is working with colleagues Debbie Niemeier, Jean VanderGheynst at the College of Engineering and Kirk Klasing, in the College of Agricultural and Environmental Sciences to explore the viability of using black soldier fly larvae (BSFL) as a feed supplement to augment the methionine levels in organic poultry feed. This multidisciplinary project, working through the UC Davis Pastured Poultry Farm, is sponsored by the "Methionine Task Force" which was formed by the organic poultry industry in the United States.

RECENT FACULTY PUBLICATIONS

[Operational challenges and opportunities in pastured poultry operations in the United States.](#)

Elkhoraibi C, Pitesky M, Dailey N, Niemeier D.

Poult Sci. 2017 Mar 3. doi: 10.3382/ps/pew448. [Epub ahead of print]

PMID: 28339966

[100K Pathogen Genome Project: 306 *Listeria* Draft Genome Sequences for Food Safety and Public Health.](#)

Chen P, Kong N, Huang B, Thao K, Ng W, Storey DB, Arabyan N, Foutouhi A, Foutouhi S, Weimer BC.

Genome Announc. 2017 Feb 9;5(6). pii: e00967-16. doi: 10.1128/genomeA.00967-16.

PMID: 28183778

[The best defense is a good \(Protease\) offense: How *Pseudomonas aeruginosa* evades mucosal immunity in the lung.](#)

Miller LA.

Virulence. 2017 Jan 19:1-3. doi: 10.1080/21505594.2016.1278335. [Epub ahead of print] No abstract available.

PMID: 28102763

[Draft Genome Sequence of Multidrug-Resistant Abortive *Campylobacter jejuni* from Northern California.](#)

Weis AM, Clothier KA, Huang BC, Kong N, Weimer BC.

Genome Announc. 2017 Apr 13;5(15). pii: e00171-17. doi: 10.1128/genomeA.00171-17.

PMID: 28408683

[Identification of a novel host-specific IgG protease in *Streptococcus phocae* subsp. *phocae*.](#)

Rungelrath V, Wohlsein JC, Siebert U, Stott J, Prenger-Berninghoff E, von Pawel-Rammingen U, Valentin-Weigand P, Baums CG, Seele J.

Vet Microbiol. 2017 Mar;201:42-48. doi: 10.1016/j.vetmic.2017.01.009. Epub 2017 Jan 12.

PMID: 28284621

[Early Life Wildfire Smoke Exposure is Associated with Immune Dysregulation and Lung Function Decrements in Adolescence.](#)

Black C, Gerriets JE, Fontaine JH, Harper RW, Kenyon NJ, Tablin F, Schelegle ES, Miller LA.

Am J Respir Cell Mol Biol. 2017 Feb 16. doi: 10.1165/rcmb.2016-0380OC. [Epub ahead of print]

PMID: 28208028

[Large-Scale Release of *Campylobacter* Draft Genomes: Resources for Food Safety and Public Health from the 100K Pathogen Genome Project.](#)

Weis AM, Huang BC, Storey DB, Kong N, Chen P, Arabyan N, Gilpin B, Mason C, Townsend AK, Smith WA, Byrne BA, Taff CC, Weimer BC.

Genome Announc. 2017 Jan 5;5(1). pii: e00925-16. doi: 10.1128/genomeA.00925-16.

PMID: 28057746