CENTER FOR EQUINE HEALTH

HorseReport

SCHOOL OF VETERINARY MEDICINE • UNIVERSITY OF CALIFORNIA, DAVIS

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UCDAVIS
VETERINARY MEDICINE
Center for Equine Health

DIRECTOR'S Message

As the director of the Center for Equine Health, I am proud of the collaborations that allow us to serve the equine community in an impactful way. This issue focusing on equine reproduction highlights some of those partnerships.

The chief of the Equine Reproduction Service, Dr. Ghislaine Dujovne, and I are dedicated to providing educational opportunities that benefit students and residents in their careers. Together, our units provide hands-on experiences for everything from artificial insemination to neonatal care. In partnership with the Department of Animal Science, the yearlings from our breeding program are now part of the Horse Barn Production Sale, which will be held on June 22, 2019.

As part of this issue, we are also highlighting our contagious equine metritis (CEM) quarantine program. Even for those with no plans to import horses, it is useful to understand the importance of protecting the equine industry from this foreign animal disease. Our staff work with Dr. Katie Flynn, CDFA veterinarian, to provide owners with a smooth process and timely release. In more than 40 years of serving the equine community by upholding this protective protocol, we have never released a CEM positive horse. In order to continue to provide outstanding service, CEH has been making upgrades to our quarantine facilities. Please visit our website to learn more.

I am grateful to all of our partners, and to all of you who support our mission. Follow us on Facebook for the latest updates, and of course to see pictures of our new foals!

Carrie J. Finno, DVM, Ph.D.
CEH Director

New quarantine stalls at CEH have been renovated to include larger runs. ▶

The riding arena at CEH has been updated with new footing. ▼

The Center for Equine Health recently completed upgrades to the quarantine facilities, including two fully renovated stalls with larger runs and specialized matting. The riding arena and round pen have also been updated with brand new all-weather footing. Visit our website or contact us for more information.

CRITICAL CARE for Foals

This Friesian colt spent a month in the NICU after being born premature.

Sick foals can have some of the highest mortality rates in veterinary medicine. The dedicated team of professionals in the Lucy G. Whittier Neonatal Intensive Care Unit (NICU) work around the clock to beat those odds.

The highly-trained team successfully handles the most complicated cases, providing 24/7 coverage. Faculty critical care specialists, resident veterinarians, technicians, veterinary students, and undergraduate members of the UC Davis Foal Team form a cooperative effort to manage critical foals.

Recently, a 55-pound Friesian colt was born at the hospital on day 328 of gestation and showed signs of dysmaturity and aspiration pneumonia, which led to a lengthy stay in the NICU. Due to incomplete ossification of his bones, a care team member sat with the foal 24 hours a day to keep him recumbent with occasional assisted standing. Daily, the colt completed a strict regimen of physical therapy and strengthening, adjusted to his level of progression during the hospitalization. Following a month in the NICU, the then 116-pound colt was healthy enough to be released.

Very few equine hospitals have the capability to care for critical foals 24/7 for a month. UC Davis' extensive team of professionals is just one of the many advantages the school offers.

STUDYING Mare Fertility

Human infertility studies have examined the reproductive bacterial microbiome to better understand normal bacteria that live in the reproductive tract and how that may differ in women who struggle with fertility.

Dr. Daniela Orellana, a second-year resident in comparative theriogenology, is taking a similar approach to horses in a research project supported by donors to the Center for Equine Health.

"In equine reproduction, veterinarians commonly use antibiotics to treat uterine infections," Orellana said. "Occasionally, this helps achieve pregnancy. But our goal is to determine changes in bacterial populations with antibiotic use. This information gives a better understanding of how to best improve fertility, and develop treatments that improve and/or reduce the use of antibiotics in equine reproduction."

While there have been similar studies conducted on the East Coast, Orellana said West Coast studies under similar husbandry conditions are lacking. She hopes to determine whether the microbiomes—all the microorganisms that live in a particular environment—in California will differ from described microbiomes of the uterus in mares on the East Coast.

The study is being conducted in 23 healthy mares; three of those will serve as controls. DNA samples from a uterine swab are taken when the mare goes into estrus, then the mare is started on a broad-spectrum antibiotic for 10 days. On the last day of antibiotics, another swab sample and a biopsy of the uterus is taken. A third sample is taken when the mare comes back into estrus. Together, this information will paint a more complete picture of how antibiotic treatment affects the mare.

"I'm excited to take knowledge I've gained at UC Davis back home (to Colombia) to help inform equine veterinarians about the best care for challenging mares in pregnancy," Orellana said. "This residency has been an eye- and mind-opening experience, learning new things and growing in scientific knowledge to help focus my future career path."

Dr. Daniela Orellana with a newborn foal at the veterinary hospital.

THE GOAL Is Foal

It often takes a village to achieve goals. Equine reproduction at UC Davis often follows that example. Teams of veterinarians from the school's research laboratories, the Center for Equine Health (CEH), and the hospital's Equine Reproduction Service work together with supportive efforts to help horse owners welcome a new generation. Led by Chief of Service Dr. Ghislane Dujovne, equine reproduction at the hospital can provide their clients routine and advanced reproductive care.

Services provided for mares include diagnostic work-ups on infertile mares, artificial insemination, ultrasonographic pregnancy diagnosis, pregnant mare care, obstetrics, and foaling management. In addition, our clinicians manage mares experiencing dystocia (difficult foaling), working in close collaboration with veterinarians specializing in surgery, neonatology, critical patient care and anesthesia.

Services provided for stallions include investigation of infertility, stallion breeding management, fertility evaluation, semen collection and evaluation, freezing of semen, and preparation and shipment of semen. Also available are advanced reproductive technologies, including in-vitro fertilization, embryo transfer, postmortem collection and freezing of epididymal sperm from stallions and oocytes from mares' follicles.

In-vitro Fertilization

With support from the school's Veterinary Gamete Biology Laboratory, under the direction of Dr. Stuart Meyers, the service is also offering intracytoplasmic sperm injection (ICSI), an in-vitro process of impregnating a mare. Meyers' laboratory has been utilizing ICSI for nearly a decade with other species, and acquired equipment in the past two years to complete the process for equines.

Unlike the normal process of in-vitro fertilization (which generally does not work with horses), the ICSI process involves injecting a single sperm into an egg extracted from a mare. The embryo then develops in a lab for a week before being implanted in the mare. Few facilities in the country have the capability to perform ICSI fertilizations. Just over a year ago, Meyers and Dujovne worked with CEH to successfully complete the first ICSI process from fertilization to birth at UC Davis, resulting in a healthy foal (Petri – see below).

Transferred embryos generally result in pregnancies only 40-50 percent of the time. To help clients better those odds, Meyers and his laboratory are researching where in the process the embryo development breaks down. The laboratory's technology allows—at the two-cell or four-cell stage—

The Veterinary Gamete Biology Laboratory at UC Davis is run by Dr. Stuart Meyers.

Members of the Equine Reproduction Service include: technician Alanna Schober, Dr. Ghislaine Dujovne, Dr. Daniela Orellana, Dr. Catherine Renaudin, and technician Sarah Koshak.

identification of embryos that will fail. This allows Meyers to find what genes are involved in the failed embryos, and also be able to only put resources into successful embryos almost immediately in the fertilization process.

Foaling Services at Hospital

Dujovne and the Equine Reproduction Service provides a full range of foaling services with the highest quality of care anywhere in Northern California. Whether it is for high-risk pregnancies or pregnancies anticipated to be normal, the hospital or CEH can keep a watchful eye on expecting mares to give owners peace of mind.

Mares are personally monitored around the clock by a highly-trained veterinary technician staff, as well as by video monitoring and the Foal-Alert™ system. Foal-Alert™ devices are sewn into the vulva and activate when the mare goes into labor, allowing for veterinarians to immediately come to the scene.

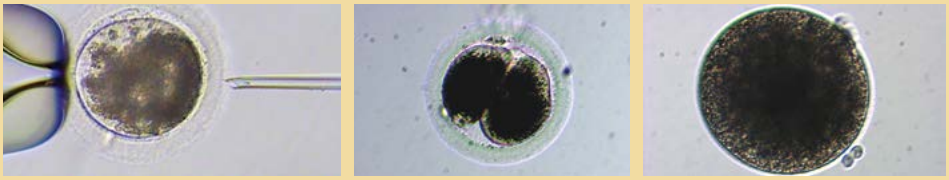
A team of board-certified specialists in both reproduction and internal medicine monitor every case. Working together, they ensure the best care for the pregnant mare, as well as both mare and foal during and after the foaling event. Veterinarians from both services are present for every foaling. Should any problems arise, the hospital's board-certified surgeons and anesthesiologists are on call to assist with dystocias and C-sections. Post-foaling complications are handled by the hospital's world-class Neonatal Intensive Care Unit (see page 3), headed by a board-certified critical care specialist.

One of the first foals born at CEH in 2019.

Dr. Ghislaine Dujovne
Chief of Service

Dr. Ghislaine Dujovne is originally from Santiago, Chile and earned her DVM degree from Universidad de Chile in 2004. Following veterinary school, she worked for four years in private practice at several Thoroughbred breeding farms and stud farms in Chile. During that time, she maintained continuing education and teaching by participating in an Animal Reproduction Diploma (Universidad de Chile) and assisting with labs and courses for two veterinary schools in Santiago. In 2008, Dr. Dujovne moved to the United States to continue her reproduction specialization, completing a residency in theriogenology at Auburn University, practicing on many species. While at Auburn, she earned a Master of Biomedical Sciences degree, and became a board-certified Diplomate of the American College of Theriogenologists. Following her residency, Dr. Dujovne accepted a clinician position in the Theriogenology Service at Auburn in 2011. A year later, she joined the faculty at UC Davis.

Petri – Embryo to Foal



On February 23, 2018, the first all-UC Davis ICSI foal was born at CEH. Aptly named Petri, see here her process from conception in the laboratory, through pregnancy, birth, and finally a healthy happy foal in the pasture! Clockwise from upper left: microinjection of a sperm into the egg that will become Petri; Petri as a two-cell embryo within 24 hours of fertilization; Petri as a blastocyst at about 8-9 days, just before transfer into a recipient mare; ultrasound confirming pregnancy at 10 days; ultrasound at 50 days; one hour after Petri's foaling; two hours later Petri nursed; Petri growing into a yearling.

CONTAGIOUS EQUINE METRITIS
Quarantine and Testing

In 1977, an outbreak of contagious equine metritis (CEM) cost the Kentucky Thoroughbred industry $4 million. As a result, federal legislation requires stallions and mares over two years of age imported from most countries to undergo post-entry quarantine to keep the United States free of this foreign animal disease. CEH is the only approved CEM quarantine facility in California.

What is CEM?

Contagious equine metritis is a sexually transmitted disease caused by the bacteria *Taylorella equigenitalis*. It is transmitted by live cover breeding, contaminated equipment, and in semen collected for artificial insemination. Mares may show no signs of infection or may exhibit mucopurulent vaginal discharge and infertility for one or more breeding cycles. Mares infected during pregnancy can produce carrier foals. Stallions do not typically exhibit signs of contamination, but can be carriers and spread the bacteria. Risk of transmission is greatest in breeding animals, so geldings are exempt from CEM quarantine.

The U.S. equine industry would suffer significant economic losses if CEM became established in this country. Mares are typically only bred during certain seasons and missing these windows due to infertility caused by CEM infection would have devastating effects on reproductive efficiency. Losing status as a CEM-free country could also have trade implications and increase export testing requirements.

CEH has recently begun to update the CEM quarantine stalls.

Undiagnosed horses are the primary sources of outbreaks. In 2000, an imported stallion was not properly identified as a carrier prior to breeding. Once the disease was detected in 2008, more than 1,100 horses had been exposed in 48 states. A total of 28 horses—22 stallions, one gelding and five mares—were ultimately confirmed as carriers, illustrating the widespread impact of a single carrier.

The CEM quarantine protocols have identified the bacteria in a significant number of imported horses. From 1997-2014, 27 stallions and 11 mares were confirmed as CEM carriers based on post-arrival quarantine and testing, heading off potential outbreaks.

Quarantine and Testing

Bacterial culture and the complement fixation (CF) test are the official tests for CEM, with culture being the gold standard. Identification of carriers relies on isolation of the bacteria from urogenital swabs. The organism is difficult to culture and grows slowly, so multiple culture samples are obtained over one week. The CF test aids diagnosis, but is limited to mares that produce antibodies to *T. equigenitalis*. It is

important to have testing performed by a lab experienced in detecting this organism to ensure accurate results.

For quarantined mares, a CF test is performed and three sets of culture specimens are collected from specific urogenital sites. Mares are treated for five days with a topical ointment that kills the bacteria and released from quarantine if all tests are negative.

Unlike mares, stallions do not have inflammatory responses to the bacteria, so the CF test is ineffective. For quarantined stallions, culture specimens are taken from four urogenital sites. Previous antibiotic treatment may suppress the bacteria and result in false negatives, so test breeding to two CEM-negative test mares is required. Post-test breeding protocols are performed on the mares, including cultures and CF tests. Stallions are treated for five days with a topical ointment that kills the bacteria and released from quarantine if all tests are negative.

The CEM testing process takes approximately two weeks for mares and a month for stallions. However, testing protocols may be interrupted for several reasons, including antibiotic treatments for unrelated health issues, potentially prolonging the required quarantine period. Treatment alone is not 100 percent effective, and it is important to identify carriers in order to trace exposed animals and stop further transmission of the bacteria. There are no CEM vaccines.

CEM Quarantine at CEH

The CEM Quarantine Station has been in operation for 40 years at CEH. Horses of various breeds, ages, and backgrounds are transported to the facility each year, and specially trained staff provide each horse with individualized care. Biosecurity is the highest priority. Bloodwork is performed at entrance and exit examinations to evaluate each horse's overall health, and serum is banked should additional testing be required. All veterinary needs are handled by the world-renowned UC Davis veterinary hospital.

"At CEH, the horse's health is a priority, not just the testing for import," said Dr. Katie Flynn, equine veterinarian for the California Department of Food and Agriculture. "Overall health and well-being are addressed and disease prevention and biosecurity are emphasized in their CEM program."

To enhance the experience for clients and horses, updates to the facility are underway. Two quarantine stalls have been renovated and the round pen and riding arena have new footing. Individualized exercise programs are available and owners receive regular updates while horses are at the facility. CEH makes every effort to facilitate a smooth process and on-time release of quarantined horses.

CEH works with Dr. Katie Flynn and the California Department of Food and Agriculture to administer the quarantine program.

Exercise programs are available for horses quarantined at CEH.

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www.vetmed.ucdavis.edu/ceh

Mail ID 1415
Center for Equine Health
School of Veterinary Medicine
University of California
One Shields Avenue
Davis, CA 95616-8589

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Equine Reproduction Service

The Center for Equine Health works closely with the hospital's Equine Reproduction Service to provide hands-on teaching opportunities for veterinary students. Every year, 3-4 CEH mares are bred, giving students the chance to be involved in every step, from artificial insemination through pregnancy, birth, and neonatal foal care. Pictured are the dams of CEH's 2019 foals. The 2018 foals will be part of the Horse Barn Production Sale in June, marking the second year of the partnership with campus' undergraduate Animal Science program.

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