



Winning Strategies in Horse Health

Closely linked clinical and research programs of the school serve as international standards for equine health and well-being, including accurate diagnosis, novel treatments, solutions to the most complex cases, and the training of future leaders in equine practice. Founding faculty members were the first to specialize in such fields as reproduction, surgery, oncology, ophthalmology and other specialties that brought recognition to the school. Current faculty build on this tradition of excellence with ongoing innovation:

Stem cell therapies – Equine experts lead a program focused on the use of healthy, regenerative cells (stem cells) to repair ligament or tendon injuries in horses. Faculty completed early safety studies and have applied stem cell therapy in the clinic with positive results. At the cellular level, regenerative medicine studies may benefit human health; veterinarians are working with colleagues at the School of Medicine to pool scientific knowledge and experience in this promising new field.

Innovation in laminitis treatment – Using a novel anti-inflammatory compound, an equine clinician successfully treated a young Thoroughbred mare whose life was imperiled by [laminitis](#), beginning a promising study of the drug's safety and effectiveness in treating this stubborn problem of the equine foot.

Sophisticated tactics fight infectious disease – Effective vaccines are critical to the control of infectious diseases and safe international movement of horses, especially as climate change disrupts previous patterns for the spread of disease and vectors. A 20-year collaboration of an equine virologist with colleagues at the University of Pretoria, South African has yielded development of a recombinant vaccine that protects against [African horse sickness](#). This team also developed a test expected to become a global standard for diagnosis.

Addressing welfare concerns – Economic hardships since 2008 and other factors left many horses neglected by owners, and abandoned animals have overwhelmed rescue organizations. School leaders responded to the crisis immediately, working with stakeholders in many ways:

- Faculty instituted the International Animal Welfare Training Institute, which prepares veterinarians and first responders statewide to respond to animal-related emergencies, including natural disasters, abandonment, road accidents, animal escapes and other incidents affecting livestock as well as public safety.
- Faculty published the *2009 Equine Sanctuary & Rescue Facility Guidelines* booklet, a key tool for veterinary professionals and other members of the public.
- The Center for Equine Health and Veterinary Medicine Extension published the chief guide to equine welfare, *Minimum Standards of Horse Care in the State of California*.
- The UC Davis Veterinary Emergency Response Team have mobilized dozens of volunteer veterinarians, technicians and students during animal-related emergency situations in Northern California; faculty provide expertise throughout the state and beyond.
- Veterinary welfare specialists have served government agencies and equine enthusiasts by providing much-needed practical data about safe equine transport.
- Veterinary Extension researchers have provided the most authoritative knowledge available about how to re-feed and rehabilitate starved horses.

Safer anesthesia – Hospital-based anesthesiologists were the first to develop a ventilator for equine colic surgery; use inhalation agents for safer anesthesia; and determine appropriate anesthesia protocols in the horse. Refining such vital techniques, a faculty team demonstrated in 2011 that a combination of guaifenesin and propofol for general anesthesia in horses reduces adverse reactions that can occur when propofol is used alone. Some anesthetics, including propofol, are associated with severe side effects in horses not commonly seen in other species; guaifenesin reduces some of these side effects.

Technology for better care – Faculty, technicians and engineers together designed the Anderson sling, the UC Davis large animal lift, and the UC Davis large animal skid. These devices have helped save horses and other livestock, even in dramatic airlift rescues; in the teaching hospital, the sling routinely supports recovering animals unable to bear their full weight. Other innovations include the first table designed for horses undergoing CT scans and equipment that supports an animal during a standing magnetic resonance imaging procedure.

Excellence in orthopedics – Founding faculty members established one of the nation’s first and finest clinical programs in equine orthopedics and launched the JD Wheat Veterinary Orthopedic Research Laboratory, an academic and industry partnership leading the way toward new tactics in the prevention and repair of musculoskeletal injuries in the racehorse. Faculty surgeons have developed science-based recommendations regarding surgical technique and the use of screws, plates and nail systems in surgical fracture repair.

Early clues help prevent catastrophic injuries – School researchers were the first to detect early signs of impending injury of bones and joints so that owners and trainers can address problems proactively. Aiding this preventive approach are new bone-scanning techniques, recommendations for early detection of stress fractures and management of training intensity. Knowledge generated from this team about the negative effects of “toe grab” horseshoes on racehorses has led to restrictions on toe grab height in California, reducing the rate of injury from the shoes.

Racetrack falls cause human injuries – The California Animal Health and Food Safety Laboratory in 2011 began the first analysis of human injuries related to catastrophic horse breakdowns and found that over 33 percent of jockey falls and 39 percent of jockey injuries are due to racehorse injuries in both flat and jumps racing; the findings have influenced changes in industry practice.

How to enhance reproductive success – Founding faculty members and current professors have improved our understanding of equine fertility and influenced reproductive health, from the first description of normal hormonal patterns in the reproductive cycle of the mare and protocols for timely breeding to inventing tests to measure hormone levels and initiating the first progesterone replacement therapy to help mares maintain their pregnancies. For the stallion, faculty scientists determined the best method to store and ship chilled sperm to optimize breeding success.

Solutions to the many causes of colic – Thanks to the school’s leadership in basic research into colic, combined with clinical experience in surgery and medical care, horses with colic now have a 90 percent chance of survival. Hospital faculty opened the first known intensive care unit for colic patients in the 1970s. Research since the 1980s has described the normal function of the gastrointestinal system and factors such as medication that affect intestinal motility and the effects of toxins that build up when the blood supply is compromised. Biopsy procedures and

advanced imaging techniques developed in the clinic enable clinicians to evaluate the condition of tissues and blood supply before surgery takes place. One surgical bypass technique developed in the clinic that avoids more complicated operations is now used worldwide; ongoing study of the composition of enteroliths (stones) has led to dietary recommendations that help prevent enteroliths from forming.

Dermatology is more than skin-deep – Early faculty members pioneered the discipline of veterinary dermatology. School faculty were the first to perform skin grafts in equine patients and later determined that certain problems affecting the skin may result from auto-immune disease (pastern dermatitis), genetics (“HERDA”) or even cancer.

Building stronger foals – School immunologists produced sentinel studies in 1991 showing that the use of hyperimmune plasma (plasma with high levels of antibodies) in foals is the only proven way to prevent pneumonia caused by *Rhodococcus* bacteria, a serious threat to neonates.

Comparative medical knowledge – Faculty isolated and characterized the organism that causes the emerging public health problem of human granulocytic anaplasmosis, formerly human granulocytic ehrlichiosis. The teaching hospital’s hematology laboratory team was the first to recognize the organism in horses in the 1960s. In the 1990s, investigators produced research papers showing that: The organism that causes disease in equines may be identical to the species that causes human granulocytic ehrlichiosis; the agent of human granulocytic ehrlichiosis can infect and cause disease in horses, and infected horses are immune to infection with *E. equi*; *Ixodes pacificus* is the tick that transmits the disease in the West; propagation of the infectious agent in culture is possible. This research significantly furthered our understanding of the epidemiology, genetics, pathogenesis, diagnosis and treatment of the disease. Veterinarians in the teaching hospital also discovered that a related pathogen responsible for Potomac horse fever is spread by freshwater snails.

Characterizing disease – A faculty member first characterized pigeon fever, a bacterial infection is caused by *Corynebacterium pseudotuberculosis*. Later school-based studies of the disease, once only noted in the hot, dry climate of California but now seen in other western states, showed evidence that flies and contaminated soil are involved in transmission, leading to recommendations for fly control as a preventive measure.

Revolutionized fluid therapy – Connected with faculty discoveries about “exhausted horse syndrome” at endurance events, clinicians established the foundations for intravenous fluid therapy by describing normal electrolyte balance and fluid imbalances in horses for the first time as well as developing the first diagnostic tests to identify electrolyte problems.

Launching cancer therapies – An equine cancer specialist was the first to use radiation therapy on equine tumors and the first to inject chemotherapy drugs directly into skin tumors to remove melanomas.

The first disaster preparedness plans for animals – Veterinarians led the way for California’s Office of Emergency Services to incorporate animals into disaster preparedness plans. As a result, many communities have employed established veterinary protocols for the rescue and treatment of horses affected by fire, flood and other emergencies.

Designated quarantine center protects California’s horses – Since 1982, the Center for Equine Health has served as the USDA's only West Coast [quarantine and treatment station](#) for contagious equine metritis. Newly imported mares and stallions undergo testing to prevent the introduction of this potentially devastating venereal disease into the

United States.

A healthier future – The Veterinary Genetics Laboratory pioneered DNA-based identification techniques in the 1990s to validate pedigrees, diagnose disease and prevent inherited disorders. Laboratory personnel and affiliated faculty have achieved numerous accomplishments, including:

- The first genetic tests to screen for lethal white foal syndrome, a deadly genetic disorder most prevalent in the American Paint Horse.
- The discovery that equine cerebellar abiotrophy, a genetic, neurological condition found in the most popular bloodlines of Arabian horses, is the result of a recessive genetic trait.
- Partnership with the national equine community to sequence the genome of the domestic horse; the mapping project, completed in 2009, has broad implications for breeding healthier horses.
- The first diagnostic test to identify hyperkalemic periodic paralysis, a serious genetic condition that makes affected horses susceptible to sporadic episodes of muscle tremors or paralysis.
- A novel test for glycogen branching enzyme deficiency, a fatal condition in certain breeds of foals.
- Identification of the gene mutation responsible for equine malignant hyperthermia and development of a diagnostic test for the rare but potentially fatal condition.

The inside story – Veterinarians at the school were among the first to employ radiographic techniques in the horse, introducing an increasing array of sophisticated imaging tools that have enabled clinicians to diagnose and characterize bone and joint problems, cancer, eye problems, lung disease, enteroliths and other disorders. A technique for arterial selective angiography for the evaluation of distal extremities, developed by a faculty member less than 10 years ago, has become standard procedure in equine imaging.

How intensive exercise affects the equine lung – After several studies of exercise-induced pulmonary hypertension, which causes bleeding in the lungs of many horses during the strenuous activity of racing, school scientists concluded that the problem is a result of stress failure of pulmonary capillaries, a process that can lead to progressive deterioration of the lungs.

Diagnosis with impact – In the 1970s, faculty of the newly opened Veterinary Medical Teaching Hospital solved the mystery of 11 related horse deaths: the animals had died from lead poisoning after emissions from nearby oil refineries settled on nearby pastures. The veterinarians alerted regulators, who took measures to assess and mitigate the environmental risks to animals and people.

Innovators in foal medicine – Clinical faculty have devised new techniques, equipment and facilities to care for the most critically ill patients in the Lucy Whittier Neonatal Intensive Care Unit. Customized stalls cushion and support sick foals while allowing them to remain bonded with their mothers during round-the-clock treatment and monitoring by a team of specialists.

Holistic therapy – A faculty surgeon integrated the first acupuncture service into the school's equine practice. As part of a holistic treatment approach, the technique particularly addresses musculoskeletal pain, neurological issues, gastrointestinal disorders and other chronic conditions to promote the body's natural healing processes.

Maintaining a level playing field – The school's diagnostic laboratory and pharmacologists initiated the [Kenneth L. Maddy Equine Analytic Chemistry Laboratory](#), the official drug-testing laboratory for California's racing industry.

Regulations on the use of drugs and drug-withdrawal times are designed to keep the playing field level and protect the welfare of equine athletes.

Connecting horses, owners and new knowledge – The [Center for Equine Health](#) is believed to be the largest intramural research program dedicated to equine health in the United States. Trailblazers in the study of equine reproduction co-founded the center, which supports and manages faculty and resident studies on all aspects of equine health and well-being. The center works closely with industry, owners and other stakeholders to identify the most pressing issues, identify funding sources and establish research priorities.

Contact: Trina Wood, (530) 752-5257
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