

## Q&A with Dr. Susan Stover

Professor of Anatomy, Physiology & Cell Biology, University of California-Davis, Veterinary Medicine; Inducted in 2016 into the Equine Research Hall of Fame, Gluck Equine Research Center



Grayson-Jockey Club  
Research Foundation

**DR. SUSAN STOVER HAS BEEN FUNDED** frequently by Grayson-Jockey Club Research Foundation. Her goal in recent research is the prevention of musculoskeletal injuries in equine athletes. Consequently, her research focus is understanding the epidemiology, pathogenesis, and biomechanics of repetitive, overuse injuries in equine athletes—so that risk factors can be identified and managed for injury prevention. She was interviewed by Jamie S. Haydon, vice president of the Grayson-Jockey Club Research Foundation.

### What first sparked your interest in exploring this area of equine research?

My research is motivated by the discovery that injuries develop over time as a result of repetitive training and racing activities. Therefore, injuries in racehorses are preventable—if we better understand the risk factors for injuries and how injuries develop as a result of the risk factors. Further, the potential impact of reducing injuries is huge—to equine, jockey, and industry welfare.

Several pieces of information dictated our current research priority. First, fatal musculoskeletal injury rates are known to be different for different race surfaces. Second, we know that different race surfaces impart different loads to the hoof and limb, with the measured loads on some race surfaces greater than the measured loads on other race surfaces. Third, we know that the mechanical behavior of surfaces varies markedly with how the surface is constructed and managed. So, not all surfaces are necessarily worse or better for injury prevention than all other surfaces, but the mechanical behavior of the surface is the key feature related to injury prevention.

Developing a standard for an optimal race surface “mechanical behavior” for injury prevention would allow racetracks to use whatever materials and management are appropriate for their climatic and operational environments to create a consistent race sur-

face behavior (feel to the horse) whenever a horse trains and races. Consequently, horses in training and racing at different racing venues would have to adapt to only one race surface behavior. Lastly, but key to making a difference, is that improvements to race surfaces would affect *all* racehorses that train and race on optimized surfaces, thus having a large impact on horses and the racing industry.

### What was the most significant finding from this research?

This study is envisioned as the first half of a four-year research program to reach our end goal. So far, consistent with our expectations, fractured fetlock proximal sesamoid bones had damage that was present before bone fracture. We learned (consistent with previous studies) that how often and hard a racehorse trains on each type of surface also affects the likelihood for fetlock bone fracture. This validates the need to include how a horse is trained and raced in our study. These are not surprising findings but illustrate that management of both race surfaces and training schedules are needed to prevent injuries. There is not a single solution to injury prevention.

What was surprising is that fetlock proximal sesamoid bones fracture in several patterns, and that the damage that precedes and predisposes to injury may occur in more than one location. However, the current study

has clearly demonstrated that pre-existing mild injuries are associated with the development of catastrophic bone fracture. This has implications, not only for our study but for detecting the damage in live horses before catastrophic fracture occurs. In association with other work on a new imaging technique (positron emission tomography, or PET scan) being explored for horses, there is a good likelihood that the pre-existing mild injuries can be detected in racehorses as improvements in the technique are made more feasible for horses. These developments are huge for future injury prevention of the most common catastrophic injury (fetlock breakdown) in racehorses.

### What aspects of the research process are relevant to this project?

It involves why we do research—because there is always more to the story than is initially apparent, and lack of attention to new discoveries through the process could lead to inappropriate conclusions and missed opportunities.

### How will this research improve equine health and soundness?

Our hope is that improvements in racetrack surface design and management, along with training guidelines, will not only prevent catastrophic, fatal injuries, but also reduce the mild injuries that delay race training and racing because the mild injuries are the early stages of the severe injuries. Collectively, race horses will be healthier and have longer careers. (In addition to the basic humane goals) this will reduce loss of horses from the racing population and result in an economically healthier racing industry. **BH**