# Equine Research News

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***Providers of Equine Research From 1940 thru 2016***

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## GRAYSON FUNDED RESEARCHERS ELECTED TO EQUINE RESEARCH HALL OF FAME

Grayson-Jockey Club Research Foundation congratulates Dr. Norm Ducharme and Dr. Sue Stover for their election into the Kentucky Equine Research Hall of Fame.

Grayson has funded seven projects for Dr. Stover, who has made substantial contributions to the ability to understand injury as well as innovative work in racing surface safety. It was research conducted by Dr. Stover which revealed that a majority, as high as 90 per cent, of catastrophic injuries are preceded by some form of pathology. The Hall of Fame is housed in the University of Kentucky's Maxwell Gluck Research Center, but honors researchers from many institutions. Dr. Stover is director of the J.D. Wheat Veterinary Orthopedic Research Laboratory at the university of California-Davis.

Dr. Norm Ducharme's project, "Thyro-hyoid muscle training to treat DDSP" is currently being funded by Grayson. Dr. Ducharme is a James Law Professor of Surgery and staff surgeon at Cornell University Hospital for Animals and Cornell Ruffian Equine Specialists. Much of his clinical and research effort has been understanding the equine upper airway physiology during exercise, with the focus on methods of identifying and quantifying dynamic upper airway obstructions, defining the anatomical structures and their function and developing surgical and other methods of treatment for upper airway diseases in the horse. He graduated from veterinary college at the University of Montreal in 1979 and completed his internship and residency at Cornell University's College of Veterinary Medicine in 1982. He received his master's degree from the University of Guelph and became a diplomate of the American College of Veterinary Surgeons in 1985. Dr. Ducharme served as president and chair of the board of the American College of Veterinary Surgeons from 2005-2007.

*The following article appears with permission from The Jurga Report: Horse Health Headlines*
*http://equusmagazine.com/blogs/the-jurga-report*

***In this edition:***



## UC Davis Vet School's Dr. Sue Stover Elected to Equine Research Hall of Fame

*Dr. Susan Stover*

Halls of Fame aren't just for elite athletes or musicians—they are for ground-breaking researchers like Dr. Susan Stover as well. A professor of veterinary anatomy, Stover was notified this week that she has been selected for induction into the University of Kentucky Equine Research Hall of Fame. This prestigious award honors scientists who, through many years of research, have contributed significantly to the field of equine veterinary science.

The Equine Research Hall of Fame is located in the Maxwell H. Gluck Equine Research Center in Lexington, Kentucky. The Hall of Fame was established to honor individuals who have dedicated their careers to expanding the body of knowledge of equine science through their contributions to basic or applied research. The award is a tribute to renowned scientists from around the world and serves as an international forum for honoring top achievements in equine health research.

As director of the school's J.D. Wheat Veterinary Orthopedic Research Laboratory, Stover is described as having had a transformative effect on the understanding of the pathophysiology

of catastrophic musculoskeletal injury in performance horses, and is known for charting new and sustained improvements in the welfare of these horses and the practice of veterinary medicine.

Catastrophic fractures in racing horses continue to be a major welfare issue, and her research contributions have had an international impact and have influenced decisions on approaches to training and rehabilitation, horseshoeing, track surface types and preparation, diagnostic approaches, and fracture repair techniques for improving racetrack safety for horses and jockeys. Her career research record spans many aspects of comparative orthopedics, with a primary focus on bone development and remodeling, the response of bone tissue to exercise and the pathogenesis of fractures and ligament injury. Stover graduated from Washington State University in 1976 with a DVM and completed an internship and residency in equine surgery at UC Davis. She returned to UC Davis after working in private practice in Washington. She became the ninth recipient and first female surgeon to be recognized by the American College of Veterinary Surgeons (ACVS) Founders Award for Career Achievement and has been recognized by both her alma maters as a Distinguished Alumnus. An induction ceremony to mark this year's nominees into the Equine Research Hall of Fame will be held Tuesday, October 25 in Lexington, Kentucky. Stover is also asked to present a seminar at the University of Kentucky Gluck Equine Research Foundation while she is there.

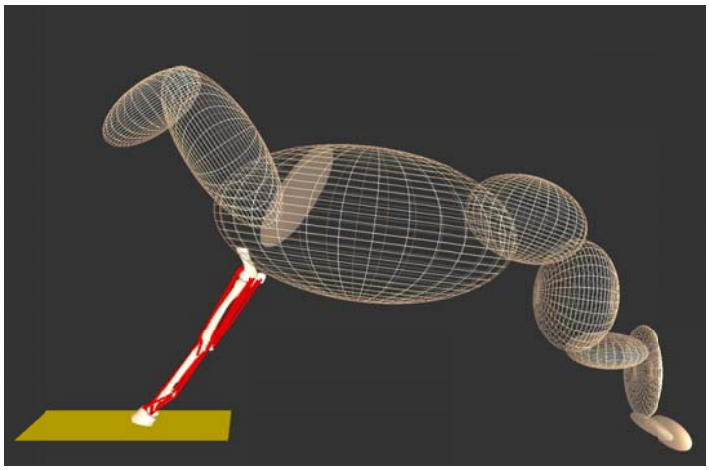
*The following article by Dr. Stover reports on a project funded in part by Grayson for which she was the Principal Investigator.*

## HITTING THE GROUND RUNNING EVALUATING AN INTEGRATED RACEHORSE LIMB AND RACE SURFACE COMPUTATIONAL MODEL

*Journal of Biomechanics, Accepted March 2016 • Jennifer E. Symons • David A. Hawkins • David P. Fyhrie*
*Shrinivasa K. Upadhyaya • Susan M. Stover - J.D. Wheat Veterinary Orthopedic Research Laboratory, University of California, Davis, Davis, CA 95616*

Musculoskeletal injuries are the leading cause of racehorse fatalities and attrition. The forelimb fetlock is the most prevalent site of injury. In postmortem examinations of horses that were euthanized due to musculoskeletal injury, veterinarians have observed many signs of damage in bones, tendons and ligaments near the fetlock. Many of these observed signs of damage are consistent with extreme angles of fetlock hyperextension.

All horses experience fetlock hyperextension during locomotion. However, the degree of this limb motion is related to forces applied by the ground to the hoof. Horses traveling at faster gaits or speeds experience greater forces applied by the ground, and thus greater degrees of fetlock hyperextension. Fortunately, forces applied to the hoof by the ground are also influenced by the mechanics of the race surface (e.g. stiffness of the race surface).



*Virtual Racehorse and Race Surface Computer Model*

Race surface mechanics are influenced by many factors, including material composition, moisture content, and maintenance procedures like harrowing. Therefore, these factors may be modulated to optimize race surface mechanics to influence limb motions.

Computer models allow researchers to economically predict limb motion changes in response to different forces. The objective of this work was to develop a computer model of a virtual racehorse and race surface. The virtual racehorse and race surface were designed to behave mechanically similar to actual racehorses and race surfaces measured in previous experiments. These previous studies measured forelimb muscle activation patterns, ligament and tendon stiffness, hoof and joint motions, as well as race surface vertical and horizontal mechanical behaviors.

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# Grayson-Jockey Club Research Foundation Race Day at Kentucky Downs


## Kentucky Downs has announced that Saturday, September 3rd will be Grayson-Jockey Club Research Foundation Day At The Race

Sponsorships available for the $350,000 Ladies Turf Stakes,
as well as three overnight races are available.
The stakes race is available at $1,000 and the overnight races sponsorships are $700 each.

Join us and support Equine research by Sponsoring one of these races on the card.
Your Sponsorship will include:

- Four Club House Tickets
- Four Luncheon Buffets
- Presentation of the Trophy in the Winner's Circle

*For more information, please contact us (859) 224-2850 -or- ebowen@jockeyclub.com*

To sign up please complete this form, along with your sponsorship donation *(or contact us)*

Name: _____

Company: _____

Address: _____

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**Sponsorships are Sold Out**
**Come Visit Us at Kentucky Downs**

*Please sign below and return to:*

Grayson-Jockey Club Research Foundation
821 Corporate Drive, Lexington, KY 40503
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Questions? (859) 224-2850 -or- email *ebowen@jockeyclub.com*

☐ Check is enclosed, payable to: **Grayson-Jockey Club Research Foundation**

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Expiration Date _____ Security Code _____

*NOTE: Charges will be listed as "Grayson" on your credit card statement.*
*Credit card billing address needed to process the charges. If the mailing address is not the same, please note the correct billing address as well.*

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Racehorse forelimb motions during gallop were simulated using the virtual racehorse and race surface computer model. During simulations, limb motions were influenced by forces applied by the ground at the hoof, as well as forces from muscles, tendons, and ligaments within the limb. Many simulations were performed using different race surface mechanical behaviors measured from dirt and synthetic surfaces, in both harrowed and consolidated conditions. Virtual surfaces with different mechanical behaviors apply different forces to the hoof during simulations, and thus were expected to produce different virtual racehorse limb motions.

Virtual racehorse limb motions were compared to actual racehorse limb motions recorded on measured race surfaces. Virtual racehorse fetlock and hoof motions had similar qualitative shape and comparable peak magnitude to motions measured in actual racehorses. The mean peak fetlock angle of virtual simulations was within 11 degrees of the mean peak fetlock angle from actual racehorse trials. Virtual hoof movements within the surface were up 4 cm greater than actual racehorse hoof movements. Most importantly, the virtual racehorse responded predictably to changes in virtual race surface mechanics. The virtual racehorse had greater fetlock hyperextension on dirt surfaces than synthetic. Additionally, the virtual racehorse had greater variability in fetlock motion on the virtual dirt surfaces than synthetic. Similar observations were true for trials collected from actual racehorses on dirt and synthetic surfaces.

Based on the computer model's ability to produce comparable limb motions to experimental data and biologically reasonable fetlock and hoof motions, future studies may use the computer model to explore the effect of race surface parameters (individual and combined) on increasing or decreasing distal limb motions and establish guidelines for race surface mechanics that modulate limb motions and forces to promote musculoskeletal health in racehorses.

*Acknowledgements: This work was supported by the Grayson-Jockey Club Research Foundation, Inc., the Dolly Green Research Foundation through the Southern California Equine Foundation, the UC-Davis Center for Equine Health, and Bill Casner.*