

**University of Minnesota** (\$64,932.00)

*“Selective Breeding Practices in the American Quarter Horse: Impact on Health and Disease”*

Selective horse breeding has produced Quarter Horses that are highly successful in a variety of performance disciplines. Although the breed is diverse, the researchers believe selective breeding has led to substantial genetic structure within the QH breed, with decreased diversity and potential concentrations of genetic diseases in some subpopulations. Study seeks to 1) determine if there is a detrimental decrease in genetic diversity in some subpopulations; 2) Identify disease and other genes that breeders are over selecting for or under selecting for when they breed for a trait in halter, pleasure, cutting, reining, working cow horse and racing performance categories. Investigator(s): Molly McCue DVM, PhD, Stephanie Valberg DVM, PhD and James Mickelson PhD

**University of Massachusetts** (\$16,825.00)

*“The Role of MMPs 1, 2, and 13 and ADAMTS4 in the Pathogenesis of Equine Laminitis”*

It is estimated that 2 to 7% of all U.S. horses will develop laminitis each year. Although there are many factors that initiate laminitis, no causative direct molecular mechanism has been identified. This research team has shown that the matrix metalloproteinases (MMPs) 1, 2, and 13, and aggrecanase 1 (ADAMTS-4) are expressed during the acute phase of starch induced laminitis. Matrix metalloproteinases are zinc dependent proteases that degrade extra cellular matrix proteins. Extra cellular matrix proteins are the structural entities that surround and support the cells of the horse's foot lamina. The goal of the research is to determine if there is an increase in the activity of MMPs 1, 2, and 13 and ADAMTS-4 during the initial phase of laminitis that initiates the destruction of the support matrix leading to hoof wall separation and coffin bone sinking.

Investigator(s): Erica Pawlak – Young Investigator

**Washington State University** (\$20,000.00)

*“Development of Suicide Gene Therapy for Eradication of Equine Sarcoids: An In Vitro Pilot Study”*

Sarcoids are the most common skin tumor in horses representing 90% of equine skin tumors and 20% of all equine tumors. They present a major therapeutic challenge, often requiring multiple treatments with a variety of treatment modalities. Suicide gene therapy is a novel treatment approach that entails the delivery of a foreign gene into the tumor cell without damaging normal tissue. A wide system of suicide gene therapy

systems have been developed in human medicine that involve the delivery of a gene encoding a suicide enzyme that converts a non-toxic prodrug into a toxic metabolite which destroys the tumor cell. The study aims to 1) compare various suicide gene therapy systems for optimal cell killing effects on sarcoid cell lines and 2) access suicide gene delivery by electroporation (using electric pulse to carry a molecule into a cell).  
Investigator(s): Camila Rios Salomao de Souza – Young Investigator

**University of Georgia** (\$49,548.00)

*“Mesenchymal Stem Cell Tracking using Superparamagnetic Iron Oxide Particles in Equine Tendonitis”*

Study focuses on the optimization of stem cell therapy for horses affected with tendon injuries. Tendon strains and sprains are very common injuries to the lower leg of performance horses. Recent successes have been reported with the injection of mesenchymal stem cells derived from adipose tissue, bone marrow or umbilical cord blood. Although the therapy appears to work little is understood about the behavior of the intra-lesionally implanted stem cells including their migration patterns and rates of disappearance from the injury site. The study will be focused on 1) introducing small iron-based particles in stem cells to make sure the process does not damage the cells and 2) image the stem cells containing the iron oxide particles with Magnetic Resonance Imaging (MRI) in lesions created in the superficial digital flexor tendon or research animals to determine the migration and treatment patterns of the technology.  
Investigator(s): John Peroni DVM, Shannon Holmes DVM and Jennifer Mumaw PhD

**University of Kansas** (\$64,773.00)

*“Adapting a Human/Mouse Therapy for Autoimmune Disease to Treat Equine Recurrent Uveitis”*

Equine Recurrent Uveitis (Moon Blindness) is inflammation of the eye that affects up to 15% of horses and often results in blindness. Recent studies have indicated that ERU has the characteristics of an autoimmune disease where the horse’s immune system attacks normal tissue. In this case the eye. Current therapies are focused on the use of steroid to suppress the immune system and are ineffective. The study will attempt to control the action of the immune system by using peptides that have been successful in treating rheumatoid arthritis in people, to block the delivery of the activation signal for T-cells from horses. A mouse model will be used for this study.

Investigator(s): Stephen Benedict PhD

**Texas A&M University** (\$40,724.00)

*“Discovery of Genomic Copy Number Variants in Equine Cryptorchidism”*

Cryptorchidism is a failure of one or both testicles to descend into the scrotum. It affects 2 to 8% of male foals. The highest incidence is in QHs followed by Percherons, American Saddlebreds and ponies. The condition may affect fertility and is associated with increased costs and health risk due to the surgery needed to remove the undescended testis(es). Cryptorchidism is a heritable condition in some mammals but this has never been proven in horses. The proposed research builds upon recent discoveries in humans showing that genomic copy number variants (CNVs) are associated with Cryptorchidism. The researchers hypothesize that CNVs are also

involved in equine Cryptorchidism. To prove this, they will use an equine 400,000-element whole genome tiling array to examine 10 candidate genes for the condition. Investigator(s): Terje Raudsepp PhD, Carolyn Arnold DVM, Bhanu Chowdhary PhD and Dickson Varner DVM

**Michigan State University** (\$26,365.00)

*“Navicular Syndrome: Initial Pathological Changes Occur in the CPL’s (Chondropulvinale Ligaments) and AVC’s (Arteriovenous Complexes) of the Rostral Frog”*

Navicular syndrome has long been a crippling lameness affecting many Quarter Horses. Most research has focused on the navicular bone and its associated ligaments. This research lab has found evidence that other regions of the foot in horses with navicular syndrome are underdeveloped do to a lack of stimulation. This study is aimed at examining the tissues within the heel beneath the navicular apparatus as certain support ligaments (chondropulvinale ligament-CPLs) and their blood supply between the deep digital flexor tendon and the lateral cartilage are damaged in the very early stages of the disease. They believe these changes occur prior to other changes of the navicular bone and associated ligaments. This study will examine this region histologically and begin to correlate the changes within the CPLs of normal and affected horses.

Investigator(s): Robert Bowker VMD, PhD, Diane Isbell DVM and Debra Taylor DVM

**University of Minnesota** (\$20,260.00)

*“Reducing Waste Associated with Outdoor Feeding of Small Square-Bales”*

Past studies have focused on large round bales and have found that hay waste from nine different round-bale feeders ranged from 5 to 33% while not using a feeder resulted in 57% loss. Other studies have found that feeding hay in a stall without a feeder resulted in 7% waste compared to 1% waste when a feeder was used. Research in yearlings fed from feeders or off the ground resulted in an 18.5% improvement in feed efficiency for those fed in feeders. This study will measure hay waste, herd weight change, and the economics of using three small square bale feeder designs (hay rack, slat feeder, and basket feeder) vs. feeding on the ground.

Investigator(s): Krishona Martinson PhD, Marcia Hathaway PhD and Craig Sheaffer PhD

Additional information related to ongoing industry research in these fields may be obtained through the equine medical research database at [www.equinersearch.net](http://www.equinersearch.net). Participating organizations include the American Association of Equine Practitioners Foundation, American Quarter Horse Foundation, Morris Animal Foundation and the Grayson Jockey Club Research Foundation.

For more information on the American Quarter Horse Foundation’s equine research program, please contact us at:

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