



FORGING INTO THE FUTURE OF EQUINE SOUNDNESS
CREATING A HEALTHIER HOOF

**HOOF DEVELOPMENT
AND REHABILITATION AT AUBURN**

A program dedicated to investigating the modeling, adaptive, and healing capabilities of the hoof



AUBURN
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ABOUT THE PROGRAM

The focus of Auburn's podiatry research is to investigate the natural adaptations of bone and soft tissue to weight-bearing load and imposed demands on the equine hoof. We hypothesize that the collateral cartilages and digital cushions of horses remodel in response to certain types of exercise. If this is true, exercise protocols may be designed to improve overall hoof health. We have established a method to evaluate the volume of the collateral cartilage and digital cushions to determine the fibrocartilage percentage of the digital cushion with advanced imaging and computer analysis software. By collaborating with scientists, experts in the private sector, and the hoof care industry we hope to advance knowledge and treatment of laminitis. The new MRI facility on campus facilitates these investigations.

“ If loading on a particular bone increases, the bone will remodel itself over time to become stronger to resist that sort of loading.”

~Julius Wolff

BONE RESPONDS TO STRESSES OF EXERCISE

“Increase in bone density, size and strength demonstrated in exercised foals.” Langon, et al., 1984

“The first phalanx (P1) undergoes change in response to exercise.” Brama, et al., 2009

CARTILAGE RESPONDS TO STRESSES OF EXERCISE

“Cartilage is thicker in trained fillies.” Firth et al., 2009

WOULD WE EXPECT THE HOOF TO BE STAGNANT?

“Australian wild horse feet from various terrains have different characteristics.” Hampson, et al., 2011

“Moving a wild horse from one location to another elicits a change in hoof morphology.” Hampson, et al., 2009

Wolff’s Law that bone remodels in response to stress and strain placed upon it has been accepted since the 19th century. Davis’ Law describes how soft tissues such as muscle respond to imposed demands. Could it be possible that the equine hoof can also change in size, shape, and structure in response to external stimuli?

While working hand-in-hand with hoof care professionals, we are witnessing the adaptive potential of the domestic equine hoof.



Pete Ramey utilizes his "in the dirt" classroom techniques as he explains the goals of laminitis rehabilitation to students in the college's ambulatory rotation.

These photos demonstrate the dramatic changes that can take place in the heel and frog region of a horse with chronic navicular disease. The photo on the left depicts an air space under the frog and an inverted central frog sulcus. The photo on the right depicts the same foot after 82 days of treatment. The air space under the frog is now replaced by frog tissue and the central sulcus is no longer inverted.

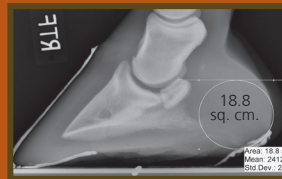


September 8, 2009

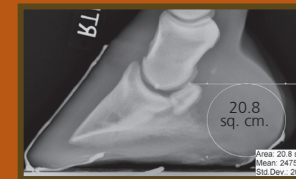


November 30, 2009

These photos below represent the radiographic change that has been noted concurrent to external hoof change.



June 15, 2010



October 13, 2010

Note the change in volume of the heel area in this hoof in the fourth month of treatment.

WHAT IS THE HEEL DOING?

In the process of monitoring horses admitted for evaluation of foot pain (both laminitis and heel pain) which have later undergone hoof rehabilitation therapy, Auburn University faculty have noted a change in the radiographic silhouette of the soft tissue components in the region of the heel.

Faculty in the departments of Clinical Sciences; Anatomy, Physiology and Pharmacology, and the Veterinary Sports Medicine Program; are partnering with the Auburn University MRI Center to seek a better understanding of the adaptive potential of the equine foot.

Auburn faculty have established a method using 3D medical image processing to evaluate the size and structure of the soft tissues in the equine hoof.

TABLE 1. HEEL TISSUE VOLUME AS % OF COFFIN BONE VOLUME

	Foot 1	Foot 2	Foot 3
Collateral Cartilages (CC)	21.4%	25.9%	35%
Digital Cushion (DC)	73.1%	97.5%	124%
CC + DC	94.5%	123%	159%

FEET THAT ARE DIFFERENT ON THE OUTSIDE, ARE ALSO DIFFERENT ON THE INSIDE

Foot 1



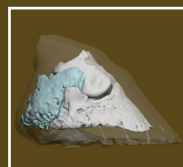
Foot 2



Foot 3



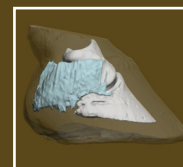
Three feet with different external hoof characteristics were selected for evaluation. Foot 1 is representative of horses that have flat thin soles and “underrun” heels. Foot 2 is representative of horses with elongated toes and narrow heels. Foot 3 is representative of horses with healthier hooves with wide frogs and heels and thick soles. Each foot was analyzed by computed tomography (CT) and magnetic resonance imaging (MRI) techniques. The three-dimensional computer reconstructed images (seen below) were created from CT and MRI data utilizing medical image processing software. The volume of the heel tissue of each foot was determined and compared to coffin bone volume in Table 1.



Foot 1



Foot 2



Foot 3



EDUCATION

Educating veterinary students and practicing veterinarians about the hoof is a primary goal of our equine clinical faculty. The College of Veterinary Medicine has hosted four podiatry conferences in the past six years with invited speakers from around the U.S. Attendees experience extensive hands-on laboratory experience, in addition to classroom instruction.

The Auburn University College of Veterinary Medicine is one of the few veterinary colleges that offer a two-week equine podiatry elective to senior veterinary students. In this elective students are exposed to all facets hoof care and the hoof care industry and learn advanced diagnostic techniques and state-of-the-art therapies for foot diseases.

CLIENT SERVICE

Auburn faculty strive to provide accurate diagnostic evaluations and effective therapeutic plans tailored to meet goals for long-term soundness and well being for their clients' equine companion or athlete.

The Auburn University John Thomas Vaughan Large Animal Teaching Hospital is a one-of-a-kind facility located in the heart of the southeastern United States.

Auburn veterinarians work hand-in-hand with professionals in the hoof care industry to provide comprehensive and long-term hoof health plans for equine patients.

“The podiatry elective is full of practical and cutting-edge knowledge about care for the equine hoof. I enjoyed every minute of the rotation and feel it is the most worthwhile elective for equine students at Auburn’s College of Veterinary Medicine.”

~Nathan Glaza, DVM

Former Podiatry Rotation Student

Invest in the Future of Equine Health

If you are interested in supporting the Equine Podiatry Program at Auburn University, we would love to hear from you. Please contact our development office.

Phone: 334.844.6733

Fax: 334.844.6715

E-mail: giving@vetmed.auburn.edu

We would like to thank Judy Thompson, Lisa Thompson Smith, and the Thompson Foundation for their generous donations to this effort in memory of their father Hall W. Thompson.



Debra Taylor's passion is equine podiatry – the professional study, care, and treatment of the foot. Dr. Taylor's interest lies in discovering methods to readjust the dynamic load of laminitic and diseased hooves to promote healing. Understanding the mechanics of blood flow, weight distribution, and local anatomic structures of a healthy foot, compared to that of a diseased foot, will allow for the development of effective treatment options that increase overall hoof health.



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