

Hoof Rehabilitation Protocol

Debra R. Taylor DVM, MS, DACVIM

Ivy Ramey AHA Member

Pete Ramey AHA Certified Farrier

Introduction: We are fundamentally against attempting to “sell” or Trademark a particular method of equine hoof treatment. Any successful hoof care and rehabilitation program must allow the practitioner significant latitude for adapting to the individual needs of the horse and to the situation presented. The sole purpose of drafting this Hoof Rehabilitation Protocol is to identify and describe the materials and methods we used to treat the hoof problems presented for our rehabilitation and study.

Summary: This hoof rehabilitation system is based on the guiding principle that many equine foot diseases that result in lameness can be resolved simply by doing everything possible to increase overall hoof health. The combination of routine corrective trimming, veterinary care, environmental stimulation, therapeutic protective devices and detailed dietary management are used collectively to improve the foot health of horses with **acute or chronic laminitis, hoof wall infections, wall cracks and caudal foot pain.**

Laminitis, lamellar separation and coffin bone rotation: The primary mechanical force working to separate the laminae is considered to be the weight of the horse combined with peripheral loading (forcing the hoof wall, rather than the sole, to bear most of the weight). Peripheral loading has the effect of suspending the horse’s weight and impact force from the laminae. We find this particularly destructive when the laminae have been damaged or weakened by acute laminitis. Additionally our therapy of laminitic horses is based on the concept that tension of the deep digital flexor tendon cannot result in stress to the laminae if the toe wall is not allowed to bear weight at impact, stance or during breakover. While tension of the deep digital flexor does exert a rotational force on P3, this force cannot **oppose the laminae** if the hoof wall remains out of contact with the ground.

We consider lamellar separation at the quarter walls (or anywhere around the perimeter of the foot) to be as significant as separation at the toe. This is particularly important to understand when attempting to reverse distal descent of P3. When acute laminitis or lamellar separation is present, our protocol calls for reducing weight-bearing by the entire perimeter of the hoof wall (with the exception of the heel buttress) typically during the first 3-5 months of treatment (duration determined based on connection of new growth, sole thickness and comfort). **This tends to immediately stabilize the dermal/epidermal laminae by removing mechanical separational forces, prevents additional rotation or sinking, allows new growth of well connected hoof walls, and can reverse distal descent of P3.**

We believe that the sole resides in the optimum position to support P3, but successful support of P3 through the sole requires that the sole be unloaded during hoof flight. This is critical to prevent blood flow restriction and thus prevent solar corium injury.

When the sole thickness is < 12mm and/or when weight-bearing by the hoof wall is eliminated, excess pressure on the solar corium can result. Our system addresses this excess pressure with one or more of the following methods of solar protection:

- Applying hoof boots with foam rubber pads and/or dental impression material.
- Applying hoof casts to cover pads and/or dental impression material that are applied to fill the solar concavity and collateral sulci.
- Glue-on hoof boots with dental impression material filling the solar concavity and collateral sulci.

- Barefoot on yielding terrain including soft ground free of rocks, loose beds of 10cm deep pea gravel (5-8mm diameter stones) and/or 5cm deep sand.
- If a solar perforation or defect occurs or if the sole under the tip of the distal phalanx is thin (i.e., < 5mm), an air space is established under this region of sole by cutting material away from the hoof pad or impression material. Barefoot turnout is eliminated until adequate sole is grown.

Our primary requirements for laminitic hoof protection are: Little or no weight bearing by the hoof wall or laminae, and no rigid attachment to the hoof wall. With each method used the sole is protected, but pressure to the solar corium is released during hoof flight. Movement (and thus pressure and release to the sole) is encouraged to prevent ischemia to the solar corium.

The following dietary restrictions are recommended for each laminitic case:

- Elimination of fruits, vegetables and other sweet or starchy treats
- Elimination of grains and/or processed feeds (excluding concentrated vitamin/mineral supplements)
- Partial elimination or complete restriction from pasture grazing (varies according body condition of the horse and size or health of available pasture)
- Constant access to grass hay tested to 10% NSC or less (in some cases reduced to smaller, multiple meals as needed)
- Mineral supplementation provided to balance nutritional content of hay/grass to meet NRC recommendations.

Heel height: Established subjectively using the following guiding principles:

- 10mm maximum change [relative to the toe] to heel height at one session
- Heels trimmed at (or beveled to) a 5-10 degree positive slope from a plane parallel to the solar plane of P3
- Healthy (12+mm) callused sole thickness always preserved
- Height and shape of the heels sculpted to prioritize caudal foot comfort and heel first impact
- Approximate, eventual target of positive 5-10 degree P3 solar angle to the ground plane (exceptions readily allowed for various conformation issues)

Turnout and daily in-hand exercise are encouraged when laminitic horses have been trimmed, stabilized and have a heel first landing in boots. Riding in padded hoof boots is encouraged when **all** of the following are achieved:

- When the horse walks or trots comfortably in padded boots
- When the proximal half (new growth) of the hoof wall becomes well connected as indicated by physical and radiographic appearance of the hoof.
- When the sole thickness exceeds 8mm (as indicated by radiograph)
- If the booted horse moves comfortably and all feet impact heel first with the added weight of the rider.

Wall cracks and ‘shelly’ or weak hoof walls: We consider these problems to typically be the result of subclinical laminitis, dietary imbalance/excess/deficiency and/or inadequate hoof care. In short horses with these problems are treated identically to horses with acute or chronic laminitis cases as stated above. Additional treatment for fungal or bacterial infection of the hoof wall and connective tissue may be required.

Caudal Foot Pain: The relatively easy lifestyle horses enjoy in domestication typically does not foster complete development of the lateral cartilages, digital cushion, sole or frog corium. This in turn can cause both chronic heel pain and also a less severe ‘sensitivity’ that leads to toe first landing common in

domestic horses. It is often the compensative toe-first landing that leads to lesions of the navicular bone, deep digital flexor tendon, coffin bone, and ligaments attached to the navicular bone [Robert M. Bowker VMD, PhD].

Under our Hoof Rehabilitation Protocol caudal foot pain (with or without radiographic evidence of disease) is treated as internal weakness or developmental deficiency of the caudal foot. Our working theory is that additional damage can be prevented by allowing/encouraging a heel-first impact. This is initially achieved by:

- Prioritizing the treatment of any painful frog sulcus infections
- Preserving natural frog thickness and callus
- Trimming the heels as stated above with an eventual target of positive 5-10 degree P3 solar angle to the ground plane (exceptions readily allowed for various conformation issues)
- Keeping breakover in a position [relative to the dorsal aspect of P3] that would exist with perfect wall connection and sole thickness.
- Providing hoof protection that decreases foot pain to promote a heel first landing and meets the requirements stated above.

Once comfort and heel first impact are established, the internal development of the foot is encouraged by:

- Keeping the horse barefoot (for turnout) and the feet routinely (every 3-6 weeks) trimmed/balanced.
- Encouraging exercise/riding in padded hoof boots. Our working hypothesis is that the vertical flexion of the boot promotes lateral cartilage flexion/development, and the foam rubber pads stimulate development of the solar corium, frog corium and digital cushion. Barefoot riding is allowed only when comfort and heel first impact is achieved on the given terrain. Barefoot riding is then encouraged, as it tends to accelerate foot development.
- Pea gravel loafing areas are provided in stalls, around gates, shade or watering areas the horse frequents. This stimulates and calluses the bottom of the foot while providing vertical support to P3 through the sole.
- Turnout with pasture mates as much as possible to maximize movement, and thus maximize the stimulation of internal foot development.

The realistic goal is not to reverse the navicular pathology presented, but arrest its progression and to complete the development of the caudal portion of the foot. Implementation of this hoof care and husbandry system typically results in a wider, stronger 'more able' foot and a comfortable horse. The distinguishing advantage to this system for horses with caudal foot pain and 'navicular syndrome' is that soundness and usability typically increase over time and the need for protective or corrective devices decreases.