

The Unfettered Foot: A Paradigm Change for Equine Podiatry

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“Primum non nocere” (“First, do no harm”)

–Attr. Hippocrates, c. 460–377 BC

Equine veterinarians have a responsibility to study the evidence that shoeing is harmful to horses.¹⁻³⁴ At graduation, we swear an oath to use our knowledge to enhance animal health, and we accept, as a lifelong commitment, the obligation to continually improve our knowledge and competence.

AQ2 In the last 8 years, a quantum leap has been achieved in the understanding of hoof care. The speed and distance of the leap have left many veterinarians and farriers feeling, in the words of the old song, “bewitched, bothered and bewildered.”¹ The result is that for a period of time yet, a widely stretched spectrum of professional opinion will exist, together with some tension, concerning what is considered to be appropriate hoof care. At the traditional end of the spectrum are farriers who combine their knowledge of hoof anatomy with blacksmithing skills to provide a metallic system of hoof care that has been firmly in place for over 1000 years. At the opposite end of the spectrum is the new paradigm that first emerged in the closing years of the 20th century. These are barefoot systems of hoof care initiated by 2 pioneers, a veterinarian, Hiltrud Strasser, and a farrier, Jaime Jackson. They are based on and nourished by knowledge gained by research, observation, and trimming to provide physiologically acceptable, non-metallic systems of hoof care.^{2,4,5,7}

Many farriers, and many veterinarians who have previously obtained farriery credentials, remain ardent advocates of shoeing. Though they damn their craft with faint praise when they concede that shoeing is a necessary evil, they revoke this weakness by citing the millennium-long history of shoeing, under management strictures imposed by non-leisure usage, as evidence that horses suffered no ill effects from such a practice.^{26,2}

The farrier-cum-veterinarians are fighting a rear-guard action to defend the metallic end of the spectrum. Feeling the need to stay loyal to their first profession and its traditions, they are finding it difficult to defend their position in the face of an increasing army of knowledgeable horse owners who have studied barefoot hoof care. It is easy to sympathize with their dilemma. As more and more horse owners demonstrate success in working their horses without steel shoes, unheeding farriers and veterinarians alike will become increasingly uneasy at remaining entrenched in the metallic end of the hoof care spectrum. Using the knowledge of natural hoof form and function as the basis for barefoot hoof care advances our success with horses, whereas holding fast to an untenable paradigm leaves hoof care mired in the past.

I am fortunate to have practiced at both ends of this spectrum. Having been raised and employed on working cattle ranches in Arizona, I learned from the wisdom of 3 generations how to shoe the horses to get the work done. These jobs demanded long hours of cross-country riding, a chore I recall as being dictated by necessity rather than choice. I am now aware that it is not only possible, but preferable, more efficient, and healthier, for horses to work barefoot.³²⁻³⁴

Nevertheless, the entrenched opinion of most farriers and veterinarians is that horses are simply unable to work without shoes. It is more correct, however, to say that their *own horses* cannot work unshod, while others can. Their opinion stems from the retention of traditional thinking and, therefore, practices that have not changed appreciably over the past few decades. There are those who cling to tradition by portraying modern-day shoeing as advanced and no longer the harmful practice it was, speaking of “new shoeing methods” or even using another odd term, “natural principled” shoeing. But with awareness of hoof biodynamics and of how and why horses can be trimmed and managed barefoot, these opinions are refuted. In their place emerges a new paradigm for hoof care that enhances the welfare of the horse.

0737-0806/\$ - see front matter
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doi:10.1016/j.jevs.2004.12.008

I submit that any acceptable method of hoof care should provide the hoof capsule with the ability to (1) flex and torque in all directions in response to changes in terrain; (2) assist in the movement of blood and lymph through weight-driven pump mechanics; (3) protect sensitive inner structures from physical and environmental variables; (4) exfoliate itself in a process that eliminates old and stimulates new growth; and (4) transfer sensory information about the environment to the central nervous system.

Such criteria are met by the unfettered foot: a marvel of engineering that accomplishes these tasks by virtue of 60 million years of evolution. It possesses structures based on 3 very strong shapes—a cone-shaped inner and outer wall and coffin bone, a dome-shaped sole and coffin bone, and a triangular frog and bar heel. This arrangement is healthy and helpful to the horse only when the hoof can shape itself by movement or be sculpted appropriately by tools and remain in a dynamic state. Inappropriate sculpting or the attachment of shoes impedes all these functions and, to varying degrees, hurts every hoof and harms every horse.

Forcing the flexible hoof to function when restricted by a rigid, steel shoe is a powerful prescription for promoting the hoof's deterioration. It results in deformity of the hoof and other nearby tissues, disrupts physiologic processes, and leads to harmful overgrowth of the hoof capsule. When a shoe is finally removed, the overgrown hoof is trimmed in a manner designed to ensure the retention of the next shoe (rather than comply with the physiology of the hoof); thus, additional harm follows. Such trims do not respect the shape conducive to optimal hoof performance.

Though iron was used 1000 years ago as the material of choice to prevent hooves from wearing down, we now realize that hooves are harmed when fixed in space because of the rigidity of metal and fixed in time because the normal growth of horn is no longer being exfoliated. A review of my clinical records in equine veterinary practice over the past 10 years has revealed that 85% of hoof and leg ailments of all kinds have occurred in shod horses, including catastrophic limb fractures. Yet the proportion of shod horses among my clientele during that time was only 48%. The hoof capsule is a highly evolved and specialized area of skin, but it is still skin. Steel has no redeeming qualities as a material for protecting skin.

Shod horses have historically represented what has been thought of as a "higher level" of care in my area and throughout the equine industry, receiving "better" nutrition, housing, and management than barefoot horses. However, in my practice the incidence of limb disease and injury is 70% higher among shod horses. Shod

hooves cannot adequately dissipate forces of torque and concussion. Instead, these forces harm the hoof and are also referred up the limb to assault other structures that have not evolved to withstand these stresses and strains. The resultant harm to the horse's flesh and bone is both predictable and inevitable.

So common are hoof deformities in our daily clinical experience that many veterinarians accept them as normal. But upright cylindrical hoof capsules with high, contracted heels; long toes; flat, oval soles; and relatively horizontal hairlines represent common and severe deformities. Normal hooves have sloping, conical capsules with low, expansive heels; short toes; domed, round soles; and 30° hairlines. Many veterinarians blame the **AQ3** poor shape and condition of horse's feet today on genetic flaws, arguing that steel shoes are necessary to prevent further deterioration and breakage. But the evidence points to a simple environmental reason for the flawed feet of our domesticated horses: an overall lack of movement of both horse and hoof. From the time they are born, foals are often confined on soft footing instead of being allowed to walk and run on firm terrain. The foal's feet are not shaped by the natural wear that should start in the first few days of life.²⁴ Though we know that bone mass increases until 4 or 5 years of age, many horses are shod at 1 or 2 years old. Many adults continue to live sedentary lives and receive improper trimming and/or are shod regularly. Any combination of these variables results in hoof deformities and small feet for the horse's size. Horses rarely inherit poor feet. They develop poor-quality, atrophied feet because of improper trimming, confinement, and shoeing. My observations indicate that foals born from "genetically small-footed" parents with deformed feet have beautiful, appropriately sized feet when trimmed properly from a young age, allowed adequate movement, and kept barefoot.

Steel shoes weaken the hoof capsule. Preparation of a hoof for shoeing begins the weakening process by removing its strong, natural shape. A normal hoof is not flat in any plane, having naturally arching quarters and recessed bars and sole. But these important shapes are eliminated to permit the secure application of a shoe. A horse left barefoot, but trimmed as for shoeing, has poor hoof form, an uncomfortable gait, and impaired hoof function. Such improper trimming leaves an owner with the impression that his or her horse "can't go barefoot." The abnormally high pressure on bars and sole harms the hoof and portions of the limb and the whole of the body. With the shoe applied, the hoof incurs further harm through contact of the shoe with the outer wall. The outer wall has evolved to fulfill a function that is primarily protective rather than

weight bearing. Increased concussion and constant pressure on the outer wall causes the commonly seen rippling and buckling of horn tubule and disrupts the normal flow of the outer wall relative to the inner wall.^{7,25} The transfixing metal nails course along the distal aspect of the inner wall, transmitting the excessive and harmful concussive force from the shoe through these areas. This breach of external surfaces results in mechanical disruption of the hoof wall, an unavoidable degree of laminar separation, the invasion of saprophytic bacteria and fungi, and exposure of the hoof to extremes of temperature. In addition, shoes inhibit the pumping system that promotes full circulation in the hoof, thus reducing shock-absorbing ability.^{1,3} It is also easy to appreciate how this ischemia interferes with normal horn growth and metabolism. A congested physiology with dysplastic, weakened growth is the result, leading to the severe hoof deformities and leg diseases we see daily in clinical practice. Shoes provide such an effective barrier to sensation that their presence automatically debars a horse from being declared sound at any speed. The definition of a sound horse *should* be one free from pain that can walk, trot, and canter with animation and impulsion, *on unfettered feet*.

In my experience, the terms *therapeutic shoeing* and *corrective shoeing* are oxymorons. Five years ago, I observed and provided reluctant veterinary support for a gelding that had prolapsed both coffin bones through the soles of his front feet and, at this late stage, was finally being managed on a barefoot hoof care program. Seven months later, this gelding was being ridden, never having had anything nailed to his feet to “support” him through the ordeal. I was accustomed to forecasting 1_ to 2 years of healing time when applying the protocol of the equine digital support system (EDSS), having seen several master farriers use this system on about 50 such cases. I noticed these horses grew what appeared to be new hooves, but upon removal of the EDSS appliance, they were still unable to walk normally. When I learned about some barefoot trimming techniques, I discovered the problem: Healthy horses are suspended by their hoof capsules rather than supported by their soles, so it became clear that EDSS and other shoeing protocols encourage horn growth that remains highly dependent on solar support, ignoring the need for horses to develop strong laminar suspension. I quickly discovered that barefoot trimming techniques, boots, and a respect for the normal physiology of the hoof allowed these horses to grow durable structures with strong suspension. To “therapeutically” shoe them was contraindicated. Healing in a natural manner minimized the redundant tissue repair and metabolic stresses that the horse’s body otherwise had to endure. In this way, feet re-

gained their normal shape and outperformed shod ones in a shorter time, becoming honestly sound.

Users of EDSS and other shoeing systems often advocate that the heels of laminitic and foundered horses should be elevated above their physiologic height.^{30,31} I trust that this regrettable procedure will soon be discontinued, because laminae become even more stressed and ischemic when heels are elevated beyond physiologic parameters. The belief that deep digital flexor tendon tension must be “slackened” to prevent further coffin bone separation is erroneous. Mathematic equations and structural models indicate that it is primarily the weight of the horse on a coffin joint with higher than normal heels, not deep digital flexor tendon tension, that leads to coffin bone rotation.⁷ The majority of foundered horses have deformed heels that are already too long. To elevate them even higher is contraindicated and harmful. It robs the horse of the strength and attributes of normal hoof form and is contrary to the normal biomechanics of the hoof. It causes decreased circulation, desensitization, severe hoof contraction, coffin bone deterioration, and worsening separation. Surgical transection of the deep digital flexor tendon adds insult to injury, as it needlessly disrupts one of the important anatomic components offering dynamic support in the caudal region of the foot. Foundered horses can be managed properly through respectful sculpting of their hooves and the judicious use of boots and firm, non-concussive terrain. What the inventors of the EDSS appliances intend and what the EDSS patients in my practice develop are wildly different.

Other examples abound, such as horses with typical navicular-type pain at age 2 to teenage horses with the more classical “navicular” syndrome.⁶ When properly managed barefoot, such affected horses often achieve honest soundness, and this at a time when traditional veterinary care claims no cure for such a condition.³⁴ Navicular problems are absent in horses that have been trimmed for optimum hoof form, function from day 1, and allowed freedom of movement. Instead of investigating these shining examples and examining these case histories, most equine practitioners continue to use drugs, special bar shoes, and surgical neurectomy to attempt a “cure.” All such affected horses can be seen to have obvious deformities of their hooves, yet the drugs and shoes prescribed do nothing to provide these horses with better hoof form. A sad situation exists when large amounts of money are spent on misguided “therapeutic” or “corrective” treatments that are contrary to the physiology of the hoof and serve only to progressively worsen the horse’s condition.

The increasing body of evidence about barefoot rehabilitation techniques and the demonstrably convincing

performance of barefoot endurance horses are both fascinating and compelling. Other veterinarians that both ride and shoe cite the “impossibilities” of riding barefoot. I can say only that my own and thousands of other horses can and do ride, for hundreds of miles a week, on rocks, without steel shoes. Clearly, domestic equine hooves can be conditioned beyond a level that is customary in feral horses. Five short years ago, I lacked the knowledge of proper hoof form and function, and as a result, I was unable to salvage many horses with devastating hoof problems. It was the shoeing and the subsequent progressively debilitating hoof deformities in these horses that brought them to their end. I realized I could not, in good conscience, continue to use steel appliances to bring “healing” to hooves that were deformed owing to the use of such appliances in the first place. Now the horses I see with similar problems improve in a short time. The knowledge of normal hoof form and function is powerful. Using it to *prevent* hoof deformities beats rehabilitating deformed feet any day and is the key to honest hoof health. Pete Ramey is another enlightened “former farrier” who no longer uses metal. He writes, “Our goal continues to be for every horse to outperform its former shod self, and the hooves deliver this with shocking consistency that amazes me more every day.”²⁸

Other common but unsound arguments claim that shoes are needed because of the added weight of tack and rider, the harder terrain, and the extreme sports that are expected of the modern-day horse. Each of these arguments can be refuted, in order, on physiologic, evolutionary, and historical grounds. For example, the feet of pregnant mares comfortably adapt, in the wild, to the increased weight of the gravid uterus. Horses evolved in varied terrains, including desert, where hard terrain is the norm. The “extreme sport” of cavalry warfare was conducted for approximately 2500 years without shoes. For the last 200 years of this period, horses were carrying the “added weight” of armor and equipment.

AQ4 On weight bearing, we should recognize that steel shoes hold the sole of the hoof in a non-weight-bearing, vaulted position against the descending coffin bone. We misinterpret so-called stone bruising of the soles of shod horses as being caused by stones on the ground. This pattern of bruising originates from concussion followed by pressure necrosis of the solar corium, which cannot escape the blows of the coffin bone above and an unyielding sole beneath. Bruising of the moon sickle points to a pathology at the tip of the coffin bone and originates because of excessive heel height. Another example is the almost “epidemic” incidence of ringbone among shod horses in my practice. With or without extra weight, shod

hooves are disallowed vital flexion and torsion, forcing the proximal interphalangeal and other joints to torque unnaturally. Add to these stresses the greatly increased concussive forces from the shoe below^{7,11,24} and the weight above, and it inevitably follows that nailed-on shoes are a prescription for disease.

The provision of movement is an important factor in a barefoot management program.^{2, 4,7,12,13,24} The ideal is turnout 24/7 with companion horses on terrain that, at least in part, matches the ground on which they have to work. But where movement cannot be provided, such as for horses in more urban environments where turnout space is limited, they are still much better off barefoot than shod. All horses should be provided with dry or well-drained footing whether kept in confinement or on several acres of pasture. But firm, dry footing is mandatory for those that are confined. Daily riding or lead exercise is especially critical for the confined horse. Similarly, when horses are confined, frequent trimming of the hooves is essential to prevent the onset of imbalances, cracks, infections, and overgrowth. Physical confinement does not necessitate shoeing, but it does necessitate more regular and careful attention to the hooves and, when riding on rough terrain, the use of boots. If the unshod feet of stalled horses are cared for as outlined, they can remain healthy and sound. To achieve this goal, some simple changes in management become necessary.

My own and other barefoot horses have hooves that wear slower than steel shoes over a given period of time. If at first that seems “impossible,” stop and appreciate the critical variables that are the allies of the barefoot horse: time, wear, growth, callusing, and a dynamic existence. Their “unprotected” hooves grow overnight in response to the wear they receive between daily rides, whereas shod horses are unable to help themselves with hoof growth or balance and are totally dependent on shoes that transfix their hooves in a predetermined plane. Other interesting comparisons can be made on the basis of speed, agility, and degree of soundness.

Proprioception is significantly impaired in shod horses.⁷ Through lack of sensory feedback, they pay less attention to where their feet are landing and suffer more trauma from interference, slipping, and stumbling on rocky terrain. Having a normal (ie, highly sensitive) feedback system, barefoot horses are more agile, watch where they are stepping, avoid rocks, and rarely stumble. Owing to the superior traction of a yielding hoof, neither do they slip and slide. The result is healthy but minimal hoof wear and a safer, more enjoyable ride for them and their passengers. Those who ride shod horses on rocky ground know how dangerous it is. Those who have experienced

the confidence of a barefoot horse in such terrain are most reluctant to get back on a shod horse.

I have documented a decreased incidence of heart murmurs and lower resting heart rates in my own barefoot horses and in many barefoot endurance horses. Their cardiovascular fitness, as judged by cardiac recovery measurements, is superior compared with that of shod horses doing similar work.

One of the most compelling examples of the underlying unsoundness of all shod horses is the crippling lameness that quickly follows the loss of a shoe. This becomes a serious problem when miles from home and nails or appropriately sized boots are unavailable. If shod horses suffer no ill effects from their shoes, as many professionals contend, why are they so lame within minutes when walking a short distance without them? Again, the earlier proposed definition of a truly sound horse comes to mind.

Sound, barefoot horses, when allowed movement over a suitably demanding terrain, often trim their own feet. This is the most ideal trim they can get. But many still need trimming despite having been worked on rough terrain. Though I have mentioned little about how barefoot trimming is performed, the previous 2 sentences provide the key. A barefoot trim sculpts the horse's hoof by mimicking the effects of mileage. If occasions arise in which hoof wear does exceed growth, boots allow the work to get done.

Boots provide an outstanding option for honest hoof protection, being made of dynamic materials that move and recoil to complement a hoof capsule's function.^{28,29} They are especially helpful in this transition age of hoof care, in which the need to rehabilitate hooves harmed by shoeing is omnipresent. The number of new boot designs that have been marketed in the last 5 years has tripled, and the demand for new and user-friendly designs is increasing to the point where supply sometimes fails to meet demand. Nevertheless, riders find that the more they work with properly trimmed and conditioned horses, the less hoof boots are needed. "These days," says Pete Ramey, "I have traded in my metal shoes for state-of-the-art hoof boots, and I have learned the awesome power in allowing the 'off season barefoot healing period' to extend throughout the horse's life."²⁸ It is ironic that the iron shoe we once thought offered protection, support, and traction is now known to expose the hoof to harm, deprive it of support, and render it incapable of providing proper traction. And these are only a few of the harms that a shoe inflicts.¹¹ There just aren't any good excuses for nailing rigid steel shoes to horses' hooves, recommending their use, or standing idly by while they are used. As veterinarians, we should be advocating what is healthiest for the horses under our care.

Barefoot hoof care works exquisitely well with the natural horsemanship philosophies of today, and the welfare of the horse is enhanced. As in any work with a horse, "asking" instead of "telling" becomes our guide for trimming a hoof. Horses are only too happy to perform with their bodies and spirits intact. That spirit of the horse always keeps us coming back for more. As hoof care specialist Martha Olivo remarks, "Horses and I just 'find' each other...we always have. They have been my best teachers, and at many important levels, we keep each other whole."

It is a grave mistake for "entrenched" veterinarians to comfort themselves with the belief that the barefoot movement is no more than a passing fad. It dismisses the fact that this body of knowledge is based securely on a respect for the horse's inherent genetic endowments. If we nurture their physiologic inheritance, horses are perfectly able to complete a longer, more fruitful lifetime of work. Keeping horses barefoot is a phenomenal win-win situation, offering increased vitality and performance. Though I can continue to write about these facts, others must do their own research and use their own observational skills if they wish to arrive at the same understanding.

Championing the barefoot cause allows us to comply with the oath we took on graduation. Barefoot methods of hoof care stand firm on a sound body of knowledge. Farriers and veterinarians are the best men and women to promote this movement, as they have the necessary broad training, clientele, love for the horse, and tools. The primary objective is to improve the welfare of the horse by carefully applying barefoot (ie, physiologic) management programs. Happily, this brings its own secondary rewards, as such work is not only more successful and professionally satisfying than the traditional approach, but physically less strenuous and safer. For the cooperating farrier, it actually extends his business, as most owners would prefer not to do their own trimming. The former farrier K. C. La Pierre tells his audiences that shoeing is not, as claimed, a necessary evil. The evil arises, he says, from our lack of understanding of the hoof. It is this that leads to the belief that shoeing is necessary. Julian Huxley expressed the same thought in 5 words: "False thinking brings wrong conduct."

The currently divisive spectrum of hoof care will be less polarized in the future. Similarly, organizations can expect a decrease in sports activities that depend solely on specialized shoeing techniques. Slider shoes that allow for exaggerated sliding stops, gait-altering shoes that interfere with normal hoof flight arcs, racing plates with grabs that increase the incidence of injuries, and other appliances that are used strictly for fashion will be replaced with barefoot trimming techniques and/or boot designs that do no harm.

We are professionals, pledged to advance our knowledge and competence and offer it to people who count on us, without restraints of ego or tradition. Science is a self-correcting system, and though the corrections are often sadly delayed, they do eventually take place. For example, we no longer fight disease by bloodletting: The practice of pin firing and the use of caustics is on the wane; medial patellar desmotomy is largely a surgery of the past; and we now know that riders can communicate better with their horses if the bit is removed,^{9,14} metal in the mouth being the cause of over 100 behavior and medical problems. Clients will come to us to find out about barefoot hoof care, to discover how their horses can improve their performance and become less prone to a host of problems when barefoot. Veterinarians should be aware that there is a growing dissatisfaction among horse owners with the traditional hoof care options that are currently being offered by the profession. Already the climate of opinion among knowledgeable horse owners is such that an owner whose veterinarian has overlooked, ignored, refused, or failed to offer them the barefoot option might construe such an omission as an act of negligence.

All of us want nothing less than faster, more complete healing for our patients. We would do well to take seriously the evidence clearly indicating that horses should not be shod. Taking the lead in promoting healthy hooves, educating ourselves and our veterinary students, is a worthwhile, rewarding project and one that we have a responsibility to adopt. Those who resist shouldering this responsibility will soon find themselves corralled by horse owners who have a better understanding of the horse's foot than they do.

CONCLUSION

The shod and deformed foot is a sad and sorry sight, harmful to the horse.

The bare and healthy foot is a joy to behold and does no harm, of course.

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- a Rodgers and Hart, 1944.
- b The survival of a hypothesis over a long period of time is, of course, no guarantee of its validity. As Carl Sagan pointed out, Ptolemy's hypothesis that the earth was the center of the universe survived 1500 years before being shown to be dead wrong.

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