RETHINKING TRADITIONAL HOOFCARE:

The Strasser Theory Flies in the Face of Mainstream Farrier Logic

By Lisa Simons

AS FARRIERS AND VETERINARIANS, WE OPERATE OUR PROFESSIONAL PRACTICES ON THE premise that we shoe horses to protect and support their feet, thereby prolonging health and insuring soundness. Working horses need shoes. Research has focused on horseshoeing techniques and comparison between therapeutic shoes, as if the answer is in one shoe over another.

In our never-ending search for ways to help horses, we have considered alternatives to the classic steel horseshoe. But is it possible that, under many circumstances, the natural bare foot of a horse is capable of protecting and supporting itself as well as or better than manmade materials can? Is it possible that the bare foot provides not only adequate locomotor function but also makes an important contribution to the overall health of the horse?

This article highlights the teachings of a German veterinarian, Hiltrud Strasser. Dr. Strasser focuses on the function of the natural bare hoof of the domestic horse. The purpose of this article is to present some intriguing new ideas about the viability of the barefoot domestic horse, while at the same time sharing with my fellow professionals the soul-searching and "devil's advocacy" conflicts that working with Dr. Strasser evoked in me.

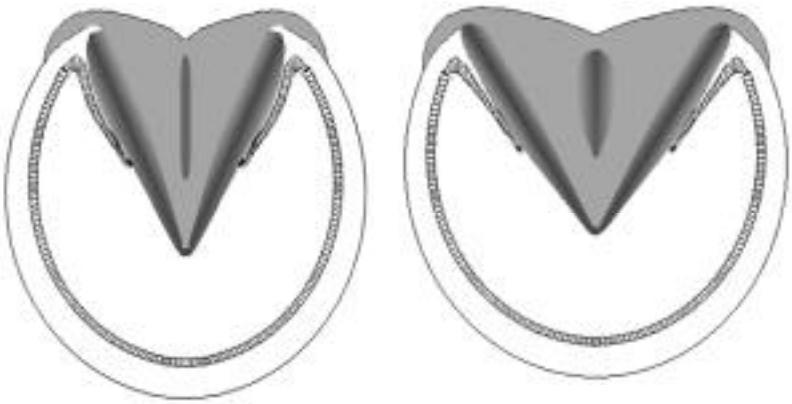
Studying Dr Strasser's theories forced me to deny many things that I "knew" were true, both techniques I had been taught in farrier school and incorporated into my practice and horse management regimen recommended by trainers to me as a competitor. For the most part, these were lessons that worked well to help lame horses regain soundness or helped athletic horses perform at their optimal ability.

Dr Hiltrud Strasser, German veterinarian with a controversial spin on hoofcare science...and a growing legion of horse-owner advocates.

I know that I am one of the few farriers in America who has worked side-by-side with Hiltrud Strasser, and my advice to my colleagues in traditional farriery is to read on, with an open mind.

The representation of Strasser's research in this article is my own interpretation; Dr. Strasser has not edited the final draft. Any unwitting misrepresentation is my error, or the editor's. My views are derived from my reading of her books in English, attendance at one of her hands-on trimming clinics in Ohio in May 2000, and my own subsequent application of some of Strasser's techniques in my own farrier practice.

Most of Strasser's papers are published in German veterinary and equine journals and are listed in the reference sections of her books. Very little is translated into English except for two books written for horse-owners; these are not



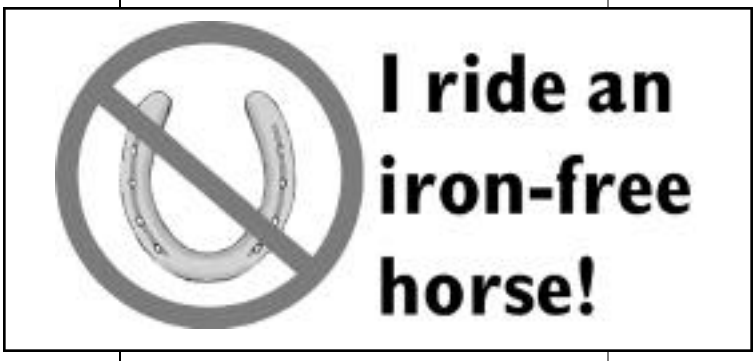
A tale of two hoof shapes: Our "normal" hoof shape (near right) with slightly curved bars is condemned as contracted by the German system,which prefers a broad frog, straight bars, and open heels. (far right)

professional-level texts, and should not be read critically as reference books. They are, however, being used as manuals for do-it-yourself owners determined to trim their own horses' feet according to Strasser principles.

To my knowledge, Strasser's professional-level writings have not been translated nor presented to the scientific community. A detailed training manual for students enrolled in her professional course has also recently been translated.

Strasser's 20 years of observation and experimentation have produced many startling statements about the equine hoof. Her data are based on hoof dissections, inspection of x-rays, and clinical case studies from her veterinary orthopedic practice. Strasser has seen living examples of successful rehabilitation of the many equine clients that pass through her clinic. She also knows many sound and healthy middle-aged horses (her own and those of clients) who have been raised according to her principles and have never worn shoes.

Dr. Strasser's presentation promotes the idea that bare hooves, left in natural conditions (or trimmed enough to simulate wear if the horse does not have the ideal living situation), are not only able to support a horse without pain, but also maintain the overall vigor and well-being of the horse.



Bumper stickers sold on the Internet for Strasser devotees

Hufmechanismus at work

European veterinary anatomists use the term *hufmechanismus*, or, in English, "hoof mechanism" to describe how the equine digit operates in motion. Hoof mechanism is defined as the reversible deformation of the hoof capsule upon weight-bearing. According to Strasser, the entire hoof wall (including the bars) is designed to expand as the hoof is loaded, and then release as the hoof is in flight. She teaches that "hoof mechanism" is the underlying principle of the healthy hoof and that without adequate hoof movement, true soundness cannot be maintained.

Limiting this expansion and contraction is known to professional farriers as "the trade-off": when we nail shoes onto a hoof, we limit the expansion of the hoof, and thus, unintentionally, we limit the health of that hoof. Veterinarians and farriers in America are taught that the majority of hoof expansion takes place in the posterior portion of the foot. Thus, typically, horse shoe nails are placed only in the anterior region of the hoof to allow posterior expansion. Strasser questions the long-held assumption that this partial expansion permits a hoof to remain healthy. She maintains that only with complete expansion can a hoof absorb shock.

The shoes themselves, made of relatively rigid materials, influence the normal function of the hoof and limb. Strasser's research, combined with other European research, links the vibratory frequency of the shoe during locomotion with damage to the hoof wall as well as to the living tissue within the foot (and entire limb).

Strasser cites Luca Bein's 1984 dissertation (University of Zurich) which demonstrated that a hoof wearing a normal steel shoe lacked 60 to 80 percent of its natural shock absorption. The same study showed that a shod hoof walking on asphalt received three times as much impact force as an unshod hoof trotting on asphalt. His findings state that the vibration frequency of the shoe was about 800 Hz, which has a destructive effect on capillaries and other tissues.

According to Strasser, all inflexible shoes induce unnatural strain on tendons and ligaments. Strain arises because at high speeds the foot is meant to land progressively from heel to toe in order to most efficiently absorb shock. Rigid shoes prevent this progressive heel-to-toe landing.

Strasser also uses the early 20th century work of German researcher Rudolph Zierold; in his PhD dissertation in 1910 (working with the famous Farrier Professor Lungwitz in Dresden); he demonstrated pathological structural alterations in the sensitive laminae of shod hooves that had appeared outwardly healthy. Comparative dissections of unshod hooves revealed no structural changes.

Hans Henrik Smedegaard, DVM demonstrated that shoeing restricts hoof function by preventing gradual breakover. His findings reveal the importance of progressive loading and breakover that will permit the bulb and lateral edge to land first, and allow the tip of the frog to give way as the navicular bone descends upon weight-bearing. Smedegaard also found that the composite "spring" system in the foot allows the bars to move independently when the foot contacts the ground with one heel first, as at high speed, or on uneven ground. Thus the natural hoof will always reduce the shock of impact by compensating for the irregularity of the ground. A shod hoof is unable to do this.

Strasser's work emphasises the importance of circulation of blood within the foot. She promotes the following scenario: A reduction of hoof expansion (due to shoes or hoof pathology) may result in a reduction of circulation which, in turn, produces a degree of de-sensitization because nerves that receive insufficient blood supply are unable to function properly. Reduced hoof expansion interferes with circulation in the following way: when the coffin bone descends upon weight bearing, if the hoof does not expand, the sole cannot spread out. If the sole cannot spread out, there is not enough room for the coffin bone. The descending bone against the unmoving sole results in pinching of the corium of the sole, frog, wall, and bars.

Basic lessons from farrier or veterinary school indicate that the trimmed hoof should be shaped like a cone; and we know that this cone grows progressively out from under the bony column during the shoeing interval. We know that it is the job of the farrier to trim the foot and re-shoe it to re-establish the conical hoof capsule back underneath the horse.

At least 200 years ago, horsemen recognized that shoes inhibited full hoof function. Nineteenth century farrier Bracy Clark demonstrated that because shoes are nailed on when the foot is off the ground and thus in its narrowest state, the foot is restricted from full movement, and thus restricted from

full shock absorbing capacity.

Strasser teaches that, logically, a foot attached to a shoe cannot grow proportionally into a larger cone. The hoof is prevented from widening at its base, and becomes more like a cylinder than a cone. This is how shoeing can cause contraction, now matter how much extra shoe is left outside the heel!

Shod hoofs are subjected to a progressive unbalancing throughout the shoeing interval because the shoe prevents natural wear.

The current practice of setting the shoe back from the toe does seem to assist the horse in wearing back excess toe growth. But heels, bars, sole and frog are not able to wear down sufficiently—i.e., naturally—in a shod hoof.

Indicators of heel contraction

Contraction, we were all taught in school, is known to have several causes: lack of moisture in the hoof, shoes that are too small, and the circulation-destroying effects of not enough exercise.

What I and many of my colleagues don't acknowledge—and what Strasser suggests—is that contraction is much more common than we might think and that our mind's eye picture of a "normal" domestic-horse foot is actually a contracted foot.

Strasser agrees that lack of exercise reduces circulation, and that lack of moisture causes the hoof to atrophy and contract. However, Strasser's definition of contraction is a significant departure from the standard view, which defines contraction from observations of horses that have been shod most of their lives. In contrast, Strasser measured many healthy bare hooves to come up with the following indicator of contraction: A straight line drawn from the tip of the trimmed frog past the heel should fall outside the heel bulb . By this standard, many "normal" horses have contraction.

Furthermore, she says, the heel bulbs themselves may have become contracted and thus this way of determining how wide the frogs should be is not always foolproof. And even heels that are outside the standard (farrier textbook) reference point are often still contracted in Strasser's view.

By her standard, healthy feet would have to have much wider frogs and heels than most of us have ever witnessed in our practices. Strasser believes that all shoes, not just those visibly too small, will cause a drawing inward of the heels.

Strasser finds that there is an important environmental factor to contraction. Horses living in soft terrain are prone to contraction. Most domestic horses spend time in soft bedded stalls, the spongy ground of a pasture, or the deep sand of an arena. These surfaces may prevent functional hoof expansion, if the foot requires the force of a firm surface in order to expand.

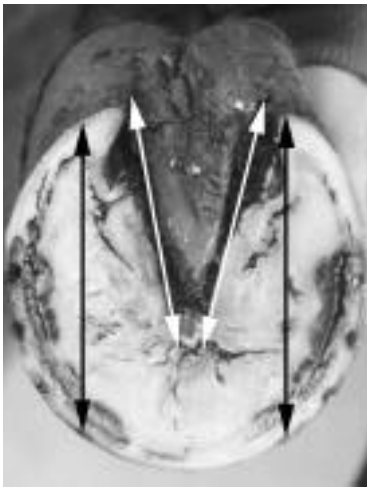
Therapeutic shoeing defiled

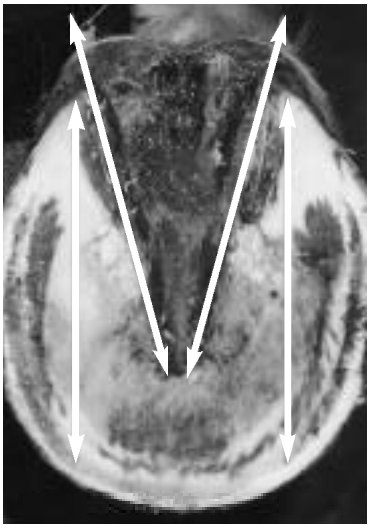
How does Strasser explain the horse that becomes progressively sounder with a traditional therapeutic shoeing solution? The heels spread, the foot acquires healthier horn growth, the shoe size goes up. Many farriers, vets, and owners have seen evidence of this; these signs are parameters of successful shoeing.

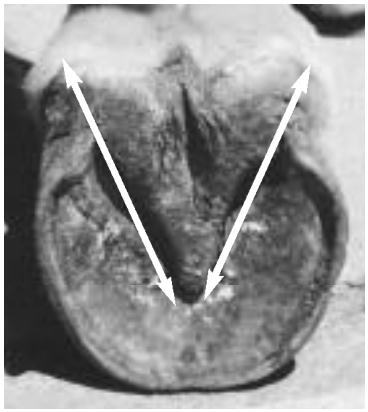
But Strasser asks us to consider some additional variables. Could the hooves have healed despite treatment rather than because of it? Could our basis of comparison bias our perception of the results? If we start with a weakened hoof, the clinical improvement we observe might only be a partial recovery. Or visible improvement might be due to a pain relief technique that masks continued underlying pathology.

At some point these signs of improvement could begin to decline and the beneficial effects of good shoeing might turn to what Strasser describes as the cumulative, incremental, harmful effects of all shoeing: hoof function is compromised and the foot will be unable to reach its full potential. Indeed, many expert farriers describe a "plateau" of recovery and a lifetime prescription of corrective shoes without which the horse would be unable to compete.

Some equine athletes do stay sound through years of shoeing and hard competitive work (e.g endurance horses). But perhaps, Strasser proposes, they could extend their functional working years if they were barefoot. Strasser reminds







Farriers are taught to follow Butler's guideline of scribing from the first nail hole back. By this standard, the front foot of this 23 year old Quarter horse (top) is unilaterally contracted. Most farriers would consider the middle foot, which is a front on a 25-year-old Arab, to be pretty typical. Strasser's view would be that it is misshapen and quite contracted. Compare that with the hind foot (bottom) of a 19-year-old barefoot Arab that hadn't been trimmed for six weeks. This broad foot with low heels, slight concavity, and naturally ("self") rolled toe similar to the American feral horse would be more acceptable to Strasser. Defining the "normal" foot is one of several stumbling blocks to a wider dialogue between Strasser's camp and more mainstream farriers.

us that lifelong soundness in shod horses may be due in part to several co-factors including: first set of shoes put on after age 4 or 5; significant stretches of time without shoes; constant turnout; high mileage exercise.

Parameters of a healthy hoof

What are the indicators of a normal hoof? There is little agreement in our professional literature. Some say frog pressure is necessary, others deny it. Some say trim the wall to an even height all the way around, others say lower the wall in the quarters. Should the bars be the same height or lower than the wall? There are no conclusive studies to tell us whether the ideal hoof should be hard or soft, the ideal coronary band be level or sloping, the ideal heels be high or low; our teachers circumvent our questions by insisting that we evaluate all horses as individuals.

1. Anatomical arcs and angles

One of the normal aspects of bone growth includes varying epiphyseal plate closure times. This is well documented and is the basis for much corrective trimming and shoeing on growing horses. Also agreed upon is research demonstrating that horses' feet increase in size up until five or six years of age. This suggests that shoeing before this age increases the chances of compromising ideal size, shape, and strength of foot bones. Strasser emphasises links between bone development and shoeing.

Moreover, Strasser's examination of coffin bones has found something else significant during a horse's early years. During the first five years of growth, the palmar processes ("wings") of P3 are slowly forming. We know that bone grows and/or deforms in response to pressure. Therefore, are horses shod before the age of five likely to have arrested or modified growth of the palmar processes?

According to Strasser, in healthy feet, the palmar processes form an open parabolic shape (imaginary lines extending past the caudal tips will diverge rather than converge), in contrast to unhealthy feet that are formed in an elliptical curve (imaginary lines extending past the wings will converge).

In Strasser's paradigm, digital arteries are compressed in the navicular region of a foot that has high heels; this resultant lack of circulation reduces nerve function. If digital arteries are impeded, the corium receives reduced blood. Compression of the digital arteries further reduces sensory perception in the hoof.

This explains why, in Strasser's eyes, high heels (or wedge pads) contribute to the *appearance* of soundness for some time even while pathological changes are taking place. These changes accumulate slowly, and by the time we see symptomatic pain, we are less likely to notice causal evidence linking the problem to foot angles, long bars, etc.

2. Heel length and angle

What are the markers of biomechanical efficiency for the equine foot? Strasser's interpretation of the geometry of P3 and related hoof/pastern axis contradicts conventional wisdom; and in turn her trimming techniques contradict many of our current guidelines. For example, Strasser's formula for healthy P3 bones in bare feet are approximately 45-50 degrees in the front (50-60 behind), and the dorsal hoof wall, if properly attached by the laminar horn and corium to P3, should match these bone angles to please Strasser.

Typically our traditional goal is to trim the front feet to a toe angle of approximately 54 degrees, and the hind feet to approximately 57 degrees.

While most farriers use toe angles as a key guideline of balance, Strasser finds that a more important balance indicator is heel height: the heel bulbs in a healthy foot will be so low that they rest on the ground!

The significant point according to Strasser is that the solar surface of P3 will be ground parallel when P3 is 45 degrees, which she has found to be the case in radiographs of healthy domestic horses.

At this point in Strasser's teaching, most farriers lose their ability to be objective. Taking off heel directly contradicts most of today's farrier training; horse owners complain if farriers trim the heel and feel that their horses don't grow enough in the heels, compared to the toe. However, numerous practitioners, including farrier Gene Ovnicek and veterinarian Barbara Page, as well as veterinarian/farrier Ric Redden, have documented that lowering the heels can be important when establishing normal function of the caudal aspect of the foot.

Strasser's controversial credo: making a "sound" horse lame is acceptable practice

So, as a farrier who is always open to learning new things, at the end of my seminar with Dr Strasser, I was ready to accept the possibility that the shoes I nail on might be doing more silent, subtle damage to horses' feet than I had originally been taught.

I submit that the following scenario is or will be a reality for many of my colleagues sometime in 2001: A horse in your care is fine, with no clinical lameness or other disease processes. The owner asks you if the horse might be even stronger and sounder if allowed to live 'barefoot and natural", as she has read about in the horse magazines. You pull the shoes, wish her good luck, and begin to head down the driveway.

Before you make it off the property, your cell phone is ringing. It's the owner of the barefoot horse, pleading, "Come back, please! My horse was so lame when I tried to lead him to the pasture you'd think I'd made him walk on a bed of nails. I guess my horse just NEEDS shoes. I made a sound horse lame!"

It is our first reaction—a reflexive, conclusion-forming habit--to say that the lack of shoes caused this horse to be worse off than he was before. Owners do not want to see their horses experience pain or discomfort.

Strasser would advise us to tell the owner that removing the shoes now will start the horse on the road to long term healing, but we must be prepared for a "transition period" that could (and will likely) include visible pain. Owners receive assurance from Strasser that this is a normal part of the barefoot process, the "naturalization", if you will, of the foot.

Strasser contends that shoeing itself is a form of desensitizing the feet. If this is true, removing the shoes will cause a restoration of sensation, and sensory awareness of the damage inside the foot. This will result in a pain response until the healing is complete.

Strasser's program is not a quick fix! Her clients are warned that they may be required to give up some riding time now—maybe even up to a full year while a whole new hoof grows out—but with the advantage that they may add on many more years of top performance later by starting the natural process sooner instead of later.

What about all the problem feet that already have low heels? Strasser has an explanation: We need to make a distinction between low dorsal toe wall angle and what we commonly condemn as 'low' heels. Heel bulbs on the ground are a mark of health to Strasser's eye. Yet in pathological feet commonly observed in America, the heel bulbs are close to the ground if the heel has grown forward and inward.

Heel and bar horn can grow too long in one of two directions: upright or sloping. Either way, according to Strasser, the foot will be contracted and the tissue inside will be damaged due to unnatural pressure. When we see an underslung foot, we conclude that the horse 'just doesn't grow any heel'. It is true that we see countless sore or lame horses with low toe angles and this underslung type of 'low' heel. Pain in such feet, according to Strasser, is usually due to resultant complications of heel contraction, not of the low toe angle, per se.

Many Strasser trims are checked for angles using not a farrier's hoof gauge, but a plexiglas template. The goal is a heel bulb on the ground, a hairline at 30 degrees, and what most of us would say is a longish toe...in other words, what American farriers generally describe as a weak foot. Most Americans would want to preserve a stout, strong heel under this barefoot horse instead of trimming it off.

The slope of the coronet (in a lateral view looking along the hairline from toe to heel bulb) on a healthy Strasser horse is a straight line of approximately 30 degrees. She teaches that too much horn tissue in the heels and bars will prevent adequate expansion, resulting in hoof contraction, and compromised blood supply and nerve impulse, which predispose the hoof to disease and lameness.

Bony alignment

Our traditional scientific literature contains radiographic evidence that the palmar processes of P3 in many horses are slightly higher than the distal tip. Some texts state that this is ideal; indeed, if a radiograph reveals the dorsal toe wall is parallel to the dorsal surface of P3, we declare that the foot is healthy, and we do not concern ourselves as much with slight elevation of the distal-palmar aspect of P3.

Farriers object that lowering the heels to achieve Strasser's ideal might result in what we call a "broken back axis"; Strasser would argue that this is the lesser evil. She contends that textbook drawings in the lateral view often misrepresent the alignment of bones and joints by showing the bones in a straight line, with an ideal slope of the dorsal hoof wall matching the pastern axis. She reminds us that the foot and pastern of the horse are designed by nature to absorb shock. Bones in a straight line, Strasser teaches, will be less effective at dampening concussive forces than bones that are articulated to form a slight curve that allows them to function like a leaf spring.

Furthermore, she continues, the steep joint angles we commonly see can actually be pathological deviations of too much heel. High heels can, over time, cause the tip of P3 to rotate towards the sole, due to overloading of the lamina in the dorsal toe wall. According to Strasser, both long underrun heels as well as long upright (high) heels are culprits in hoof capsule distortion.

We know that long toes can also stress the dorsal laminae, and we are familiar with the need to rasp down dishes and flares. Yet many of the shod feet Strasser sees actually have toes that she describes as too short. Strasser notes that short toes and breakover close to the tip of the frog are not always favorable. Since the moment of breakover requires firm contact between the ground and the distal tip of the toe wall, short toes on soft footing, for example, will cause excess strain on soft tissues as the horse struggles to establish a solid platform to push against. Many horses are asked to perform and live in soft, deep footing, she observes.

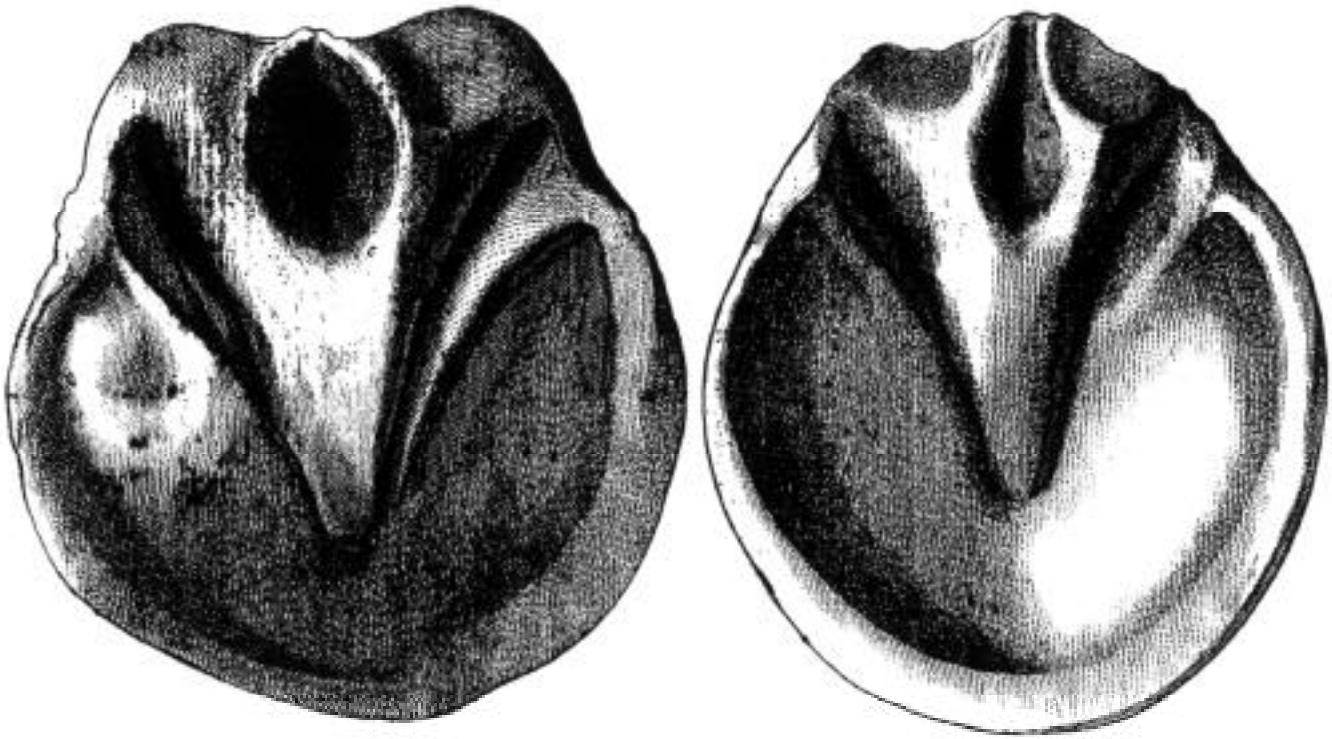
In radiographs of the foot, what is the effect on P1, P2, P3 alignment when the horse's head is below, level with, or above the withers? Strasser's book shows the joints in the whole leg opening or closing slightly in response to head height. Is there a significant range that could affect how the radiographs are interpreted if this is not taken into account? For example, if a horse has its head very high when the film is taken, it might look as if too much weight is at the back of the hoof, and 'low heel' could be diagnosed, and wedges prescribed.

By Strasser's own logic then, we cannot necessarily know what we think we know just by looking at a radiograph. We would need to have additional information about how much of the horse's weight was on the limb being x-rayed, whether it was slightly ahead of or behind the shoulder, whether another leg was up in the air at that moment, either because the horse was swatting at a fly or shifting weight, or because some one was holding up another foot to keep the horse still.

Additionally, by Strasser's own logic (although not unique to her) the foot is an elastic structure, and P3 descends upon weightbearing. Pollitt's 1993 video shows P3 moving down in the hoof capsule and back up again as the limb goes from full load to unweighted. Yet this range has not been taken into account when the standing horse is evaluated for correct placement of P3 in the hoof capsule. Strasser has noted (along with Page, Ovnicek, Jackson and probably others) that P3 is higher in the hoof capsule of American wild horses than it is in most domestic horses. Yet wild horse feet are not usually (or ever?) x-rayed in a live standing position.

Should we reduce forces on the deep flexor tendon?

The deep digital flexor tendon, Strasser says, is mechanically incapable of exerting significant rotational pull on P3 if the bone is parallel to the ground. In the case of high heels, the DDFT exerts a force in a proximal direction, rather than caudally, as it would do in normal function. Laminar stretching or separation is increased by the mechanical force on the tip of P3 as it is driven into the ground by steep hoof angles.



British veterinary surgeon Bracy Clark was so tortured by his studies of the unshod foot that he set out to design an expandable horseshoe, shown here, in 1820. He documented anatomical variations between shod and unshod horses, and followed the foot life of a mare (above) who was unshod until the age of six (left); at right, her foot after a year of shoeing.

Therefore our attempts to relieve pressure on the DDFT by applying wedge pads might contribute to the laminar separation we were hoping to avoid, if we follow Strasser's logic.

Evaluating the Strasser system

Since the 17th century, mainstream science has examined isolated segments of an organism or a society in order to diagnose cause/effect relationships of malfunctions. Our understanding of cause and effect is also confounded by chronological sequence. If we see a problem today, we wonder what went wrong yesterday. Did the owner ride the horse too hard? Did the farrier put in a hot nail? Did the vet administer too much or not enough of a drug?

But if we look at it differently, we can see another pattern emerging: maybe what we see as a symptom today has been

developing in the body for a long time, silently getting worse while we were thinking all was well. Then the breakdown happens, and that previous occurrence—the hard ride, the shoe job, the medication—was simply the last straw, finally causing the organism to visibly malfunction.

Holistic science is based on just such a philosophy of health: a malfunction is not necessarily a reaction to any single pathogen or cause, but represents the tip of an iceberg of compromised metabolic and/or musculoskeletal harmony.

How shall we react to Strasser?

Whether mainstream farriers and veterinarians agree or disagree, Strasser's perspectives on shod versus unshod horses contribute to our growing body of literature on the physiology, biomechanics, and anatomy of the hoof. In a concerted attempt to address the high rate of unsoundness in domestic horses today, professional hoofcare practitioners, veterinarians, and researchers will no doubt draw on and contribute to the emerging field of barefoot studies, whether it is to challenge Strasser or to build on her beginnings.

Those who would panic and head off on a witch hunt should carefully research the history of farriery and note that "shoeing is evil" campaigns have been mounted repeatedly in the past 300 or so years, with varying amounts of temporary success.

With luck, Strasser will clarify her work within her own profession and in the scien-

tific arena, as well as to continue to feed new ideas to her followers.

In our evolving field of equine foot studies, we are united by the common goal of providing the best possible care for horses' feet. If we are willing to study new methods, our reward may bear fruit in improved soundness for all horses.

Lisa Simons is a farrier, academic researcher and temporarily-lapsed competitve endurance rider in Vail, Colorado. Lisa still uses plenty of shoes every day, but finds the idea of barefoot high-performance horses intriguing… and attainable. She predicts that the so-called "barefoot movement" will inspire new ideas from many creative mainstream farriers .

P3 bones shown here are used in Strasser's demonstrations. She feels that the narrow contracted P3 (top, right) was deformed by years of shoeing and that the barefoot horse's P3 (top left) is the ideal. However, professionals who have done enough dissections know that variation occurs in P3 shape between individuals and that there are even breed generalities to consider. This is an area where Strasser needs to document her claims. Strasser also claims that horses in her program do not develop ossified cartilages (ring- or sidebone); the data from those studies would be interesting. if compiled and published as research.

TO LEARN MORE

Books by Hiltrud Strasser:

Lifetime of Soundness

Shoeing: A Necessary Evil?

(Note: books in German offer superior photos and art and more detail than English translations)

Die Praktische Arbeit am Umbeschlagenen Huf: Hufbearbeitung in Wort aund Bild

Gesunde Hufe ohne Beschlag

Huforthopadie: Heilen ohne Beschlag

On the web:

www.hufklinik.de (Starsser's own site)

www.thehorseshoof.com

www.unitedhorsemanship.com

Note: there are many, many web sites promoting Strasser techniques; some are closed to discussion of anything but her methods; hostility and "farrier bashing" are common. As this concept matures, dialogue will be possible, one hopes.