Hoof Care/Farriery

BY CHRISTY WEST

Horse Hoof Trimming Guidelines

One of the biggest troubles with discussing horse hoof trimming and balance is that when it comes to hoof balance, there isn't a set definition. One practitioner discussed guidelines for characterizing hoof balance and for trimming the foot to achieve proper function.

"The term 'hoof balance' has no meaning, but we all say it," said Stephen E. O'Grady, BVSc, MRCVS, of Northern Virginia Equine in Marshall, Va. "It's a concept that means something different to everyone. Hoof balance has been the term used by veterinarians and farriers to describe the theoretical ideal shape or conformation of a given foot, the position of the hoof relative to the limb above, and the way that the foot should be trimmed."

The term "hoof balance" has been used to refer to geometric balance (symmetry of hoof shape), dynamic balance (flat landing of the hoof on a hard surface), three-dimensional balance, and natural balance, said O'Grady. However, he said that no method of "balancing the foot" will yield optimum foot conformation for every variation of conformation (such as toeing in or out, or a club foot), and "balancing the foot" might yield very different foot shapes.

He offered an alternative: "An option to the term 'hoof balance' would be to use a set of biomechanical principles or landmarks as guidelines that could be applied to every horse and have a universal meaning," he said. "The foot can be evaluated, trimmed, and/or shod in a consistent, reproducible manner that considers:

- The hoof-pastern axis (HPA);
- The center of articulation;
- Heels extending to the base of the frog.

"These principles can be used by the clinician to evaluate every hoof and access the type and suitability of farriery that is presently employed," he noted. "Additionally, they can serve as landmarks for trimming and shoeing."

"The ***hoof-pastern axis*** (HPA) is our first guideline when trimming the foot," said O'Grady. When you are looking at the horse's hoof from the side, the hoof-pastern axis describes the alignment of the toe of the hoof wall with the pastern above it. If they are parallel, the hoof has a proper hoof-pastern axis. However, the pastern might have a steeper (more vertical) angle than the hoof (a broken-back HPA) or vice versa (a broken-forward HPA).

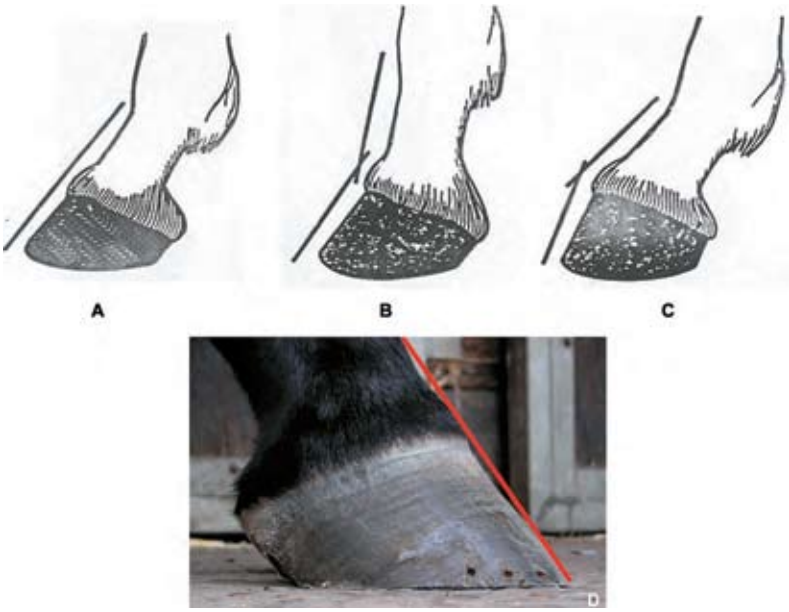

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Illustration A shows a parallel hoof-pastern axis (HPA), B shows a broken-back HPA, and C shows a broken-forward HPA. The red line in D denotes a parallel HPA.

This axis has implications for load distribution within the foot; a broken-back axis is often caused by excessive toe or minimal heel length and tends to result in excessive load on the rear of the foot. This can result in crushing of the digital cushion in the rear of the foot, and it increases load in the deep digital flexor tendon.

Conversely, the broken-forward axis (sometimes due to club foot) tends to overload the toe; underuse of the digital cushion in the rear of the foot means less shock absorption in the foot and more jarring of some structures. In addition to overloading different parts of the foot, an improper hoof-pastern axis also loads the joints of the lower limb at different angles than that for which they were designed, which can result in lameness.

O'Grady noted that the angle for a particular hoof is suitable when the hoof-pastern axis is straight, not when hoof angle approaches any ideal number.

The ***center of articulation*** is the center of rotation of the distal interphalangeal or coffin joint when viewed from the side. O'Grady said a vertical line drawn through it should approximate the middle or widest part of the foot from front to back (when viewed from the bottom).

"The widest part of the foot (center of articulation) forms a landmark on the solar surface of the foot that not only can be used as a reference point when trimming, but can also be used in evaluation of foot conformation and the existing farriery that has been performed on the horse," he said. "After the trim, the ground surface of the ideal foot or good foot will be basically as wide as it is long," and the length of the sole in front of and behind the widest part of the foot will approximate each other.

"The ***third landmark*** is the heels of the hoof capsule extending to the base of the frog," said O'Grady. This means the heels should not be long or underrun. The rearmost point of the heels' contact with the ground should be at the base of the frog, when possible.

"Often there is limited soft tissue mass in the palmar (rear of the) foot, or the wall at the heels cannot be trimmed to the base of the frog; this necessitates that the branch of the shoe or some other form of farriery extends to the base of the frog," he added.

"Becoming familiar with three basic landmarks will enable the veterinarian and farrier to approach trimming the equine foot in an individual, standardized, and repeatable manner," he concluded. "Another advantage of these landmarks is the creation of a technical language that can be used to discuss farriery between the professions, and it will form the written basis for reports and records."

Racing Quarter Horses, Toe Grabs

You've probably heard the old adage from mule fanciers: "Mules is just different." Well, it seems the same principle holds among racehorses; racing Quarter Horses, it seems, are just different. From racing Thoroughbreds, that is. Veterinarians presented study results on racing Quarter Horse injuries and horseshoe toe grabs that showed very different effects of toe grabs than those found in previous studies on racing Thoroughbreds.

Catastrophic injuries in racing seem to be attracting more attention from media and researchers these days. The increase in research directed toward reducing the incidence and severity of racing injuries is certainly a good thing, and it has resulted in some safety-oriented regulations and recommendations for Thoroughbred racing (i.e., mandates to use particular track surfaces and certain shoeing practices).

It might be tempting to extend those Thoroughbred flat-racing recommendations to all racehorses, but research suggests this might not be advisable. Mark Martinelli, DVM, MS, PhD, Dipl. ACVS, of California Equine Orthopedics, in San Marcos, discussed results of a study on the relationship between toe grabs and catastrophic injury in racing Quarter Horses.

A toe grab is a raised rim on the toe area of a horseshoe; its purpose is to help the horse "dig in" to the track and reduce slipping (much like football or baseball cleats). However, there are increased stresses on the limbs from this stronger grip on the ground and quicker "stops" of the feet when they land (normally the foot slides forward just a bit on the ground before stopping, but toe grabs arrest this slide). It's also been suggested that toe grabs add stress to the limb by raising the toe relative to the heel. Toe grabs on front feet have been associated with increased incidence of catastrophic injury in Thoroughbreds in at least four studies, reported Martinelli. *(Editor's Note: Research by Sue Stover, DVM, PhD, Dipl. ACVS, of the University of California, Davis, has demonstrated that "high" toe grabs on front shoes make a Thoroughbred 16 times more likely to suffer a catastrophic injury while racing.)*

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However, many jockeys and trainers in the racing Quarter Horse industry feel that toe grabs on front feet are not a risk. In fact, they feel toe grabs are essential for reducing slipping as these horses break from the gate. Slipping at the gate carries a risk of injury not only to the horse that slips, but possibly to other horses or the jockey.

This study did not find a protective effect of toe grabs, but it didn't find any elevated risks of injury when using them, either.

For the study, investigators measured toe grab height on horses suffering catastrophic injuries at a California track over a two-year period. They compared these values with those for all 1,314 Quarter Horses racing at a California track during January and June 2008, and they saw no significant difference in the distribution of toe grabs between the two groups (one would have expected a higher percentage of the fatally injured horses to have toe grabs if they were a problem).

Why the difference between Quarter Horses and Thoroughbreds?

Martinelli suggested several differences between racing Quarter Horses and Thoroughbreds that might contribute to differences in risk factors for injury.

Contrary to some long-held beliefs, Quarter Horses appear to pull with their forelimbs when launching from the gate, unlike Thoroughbreds. Martinelli showed several slow-motion videos of both breeds breaking from the gate, demonstrating: "In the case of the Quarter Horse starting a sprint race, the toes dig into the track and the fetlock and carpus (knee) remain flexed (bent) during the first several strides. Thoroughbreds, conversely, tend to land flat-footed and hyperextend the fetlock within the first stride from the gate."

Quarter Horses race at shorter distances (often 440 yards, one-quarter mile, or less) and higher speeds (47+ mph vs. 30+ mph for Thoroughbreds). They tend to get faster with each segment of these short races, while Thoroughbreds running longer distances get faster toward the middle of the race, then fatigue and slow down.

Despite breeding for faster horses, Thoroughbreds don't appear to be getting faster, while Quarter Horses are. "As athletic performance gets more and more intensive (in any species/discipline), chances are you'll see more injuries just from the increased physical stress," Martinelli commented.

The two breeds tend to respond differently when they do get injured, he observed. When Thoroughbreds suffer a catastrophic injury, they often fall and roll, while Quarter Horses more often misstep, then keep running while the jockeys fight to slow them down.

"Factors involved with catastrophic injuries in racing Quarter Horses have not been studied to the same degree as those in Thoroughbreds," Martinelli summarized. "Our recommendation is that the American Quarter Horse Association continue to study these horses and make sure any rules applied to them take into account the differences between racing breeds."

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