Equine Soundness

Volume 1, Issue 6 July 2008

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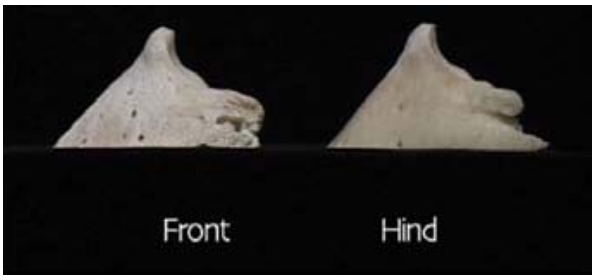
Correct Hoof Form—But Why?

W. Robert Cook FRCVS PhD: Professor of Surgery Emeritus, Cummings School of Veterinary Medicine, Tufts University, USA reminds us:

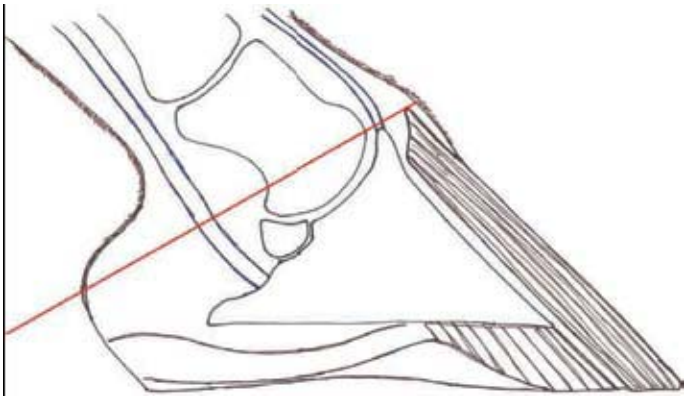
ANATOMICAL CONSTANTS OF THE HEALTHY EQUINE HOOF

The coffin bone is the template for the hoof capsule. A hoof that fails to reflect the shape of the healthy bone is deformed.

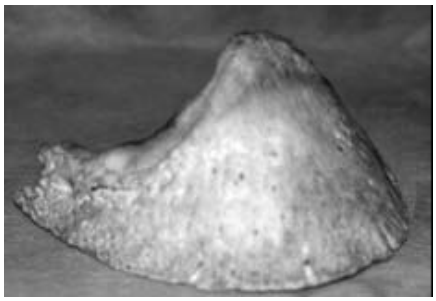
In a side view, a profile of the coffin bone is roughly triangular. The longest side of the triangle is its base (the distal border), the template for the shape of the ground surface of the hoof capsule. A collection of coffin bones from horses' fore feet show relatively little variation from one horse to another with regard to the angles of the triangle. The same is true of the hind feet. Depending on the size of the horse from which the bones came, there will be some variation in the size of the bone but the angles will be more or less constant. For this reason, there is constancy to the shape of the hoof capsule, as seen from the same side view. The following geometric constants are recognized:



When the foot is bearing weight, the distal border (base) of the coffin bone must be parallel to the ground, to allow for even distribution of forces.



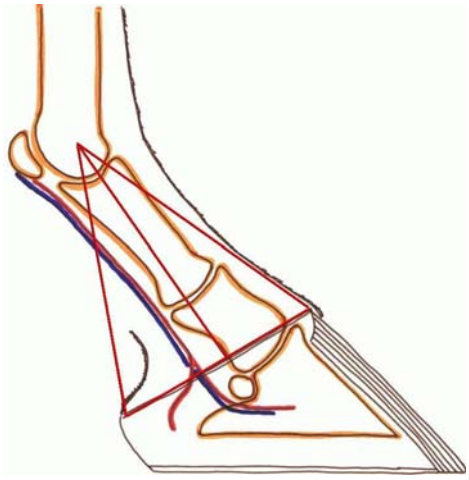
As the healthy hoof capsule duplicates the contours of the bone, it follows that the base of the hoof capsule (the



palmar and plantar surface of the hoof) must also be parallel to the base of the coffin bone.

To achieve the above it follows that, in a normal front hoof, the wall/ground angle at the toe will be about 45º and the coronet/ground angle will be about 30º

Similarly, in a normal hind hoof, the wall/ground angle at the toe will be about 55º degrees and the coronet/ground angle will be about 30º, because these are the angles that the coffin bones, by themselves, exhibit when the bones are placed upright on a flat surface.

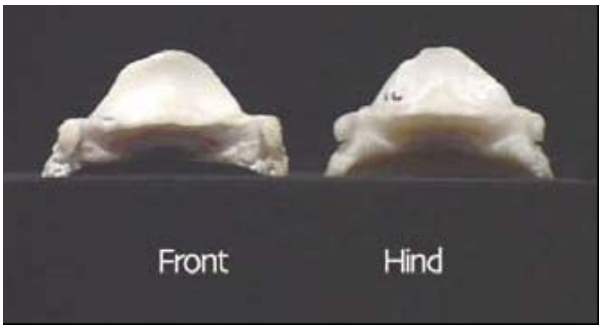


Any gross departure from the above angles, on either side, indicates a deformity of the hoof capsule.

If the angles are correct (the last two criteria), the orientation of the coffin bone and the sole of the hoof (the first two criteria) will also be correct. Thus, the two criteria that provide the key to recognizing deformity from a side view are any gross departure from:

A wall/ground angle at the toe of about 45º for the front feet and about 55º for the hind feet.

A coronet/ground angle of about 30º for both the fore and hind hooves



The solar surfaces of the coffin bones are concave, with the hind limb bones being even more strongly arched than the fore limb. Accordingly, fore and hind hoof soles should be concave, with the highest point of the sole at the apex of the frog. Flat hoof soles are deformed soles. Similarly, the shape of the hoof sole is determined

by the shape of the distal border (base) of the normal coffin bone. An imaginary line extending the collateral grooves of the frog beyond the heels should pass outside the curves of the bulbs. Hooves with heels that converge strongly are deformed.

Thus the two tests of normality as judged from the ground surface of the hoof are:

A concave sole

The frog test

As the coffin bone seen from the front is a cone, with its base wider than its top, the hoof should have a corresponding shape:

The coronet should be parallel with the base and the side walls should be of equal height

The side walls should slope outwards at the same angles as the coffin bone. In the hind hoof, the medial wall is the steepest.

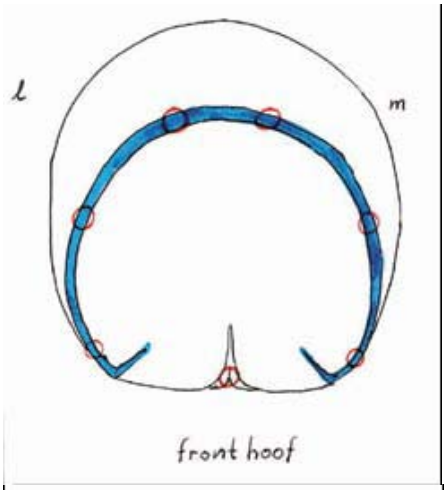
But why is the same so important?

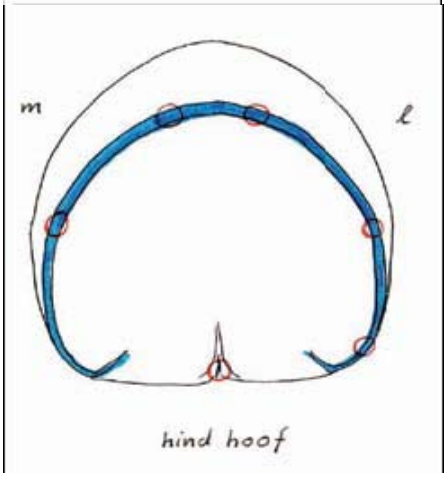
The horse stands on his hooves for most of the day (and night). He rests only periodically and sleeps no more than a few hours a day (with the exception of Seabiscuit, but that is another story).

What does this mean for our task? In a correctly shaped hoof the weight of the horse descends properly onto the hoof capsule during the weight bearing phase of the moving limb. And this is important for the health of the entire organism of the horse. What's the difference?, you may ask.

It actually is quite huge: the meridian end points lie on the coronet band just above the hoof capsule. Only when these end points, also known as ting points, are stimulated correctly, can the horse's body function flawless.

The tendons and the stay apparatus which enable the horse to rest while





standing up, are in balance and functioning properly. The hoof in its correct form functions as a shock absorber, gives the horse traction and purchase on any terrain.

The other big deal about hooves is that the horse, like most other animals, lands heel (pad) first in the process of moving. In order to do so correctly, he should have a wide frog that is able to come in full contact with the ground. The more stimulation this frog area gets, the denser the underlying digital cushion becomes. A dense digital cushion will assist in shock absorption and give the horse a comfortable area to put on the ground during the weight bearing phase of a stride.

In order to maintain correct hoof form, the horse has to be on the correct terrain for the breed, Drafts and Warmbloods on softer terrain, Quarterhorses, Arabians and Andalusians on hard terrain. In the ideal case, the horse would move so much that the growth of the hoof and the abrasion of the same are in balance. Usually that is not the case, so the hooves need to be trimmed in regular intervals. Unlike the shoeing so many of us have done every six weeks, barefoot trimming should be performed at least every four weeks. Barefoot trimming is quite a bit different from the preparation of the hoof for a shoe, so a farrier may not be your best bet to keep your horse in excellent shape, unless he also had some training in performance barefoot trimming.

Whenever you think about the health of your horse, think about the species. The horse is a prey animal, he grazes in nature all day, lives in a herd and moves many miles a day. And in order to drink, he has to have his hooves standing in water. Water keeps the hoof capsule elastic and allows it to function as a shock absorber during movement. An elastic hoof capsule also allows hoof mechanism to function. Hoof mechanism aids the body to pump blood up the legs, which is really important, as the lower legs has no muscles to aid in blood pumping and the horse's heart is relatively small, thus needs all the help it can get.

Pictures: Zenequine, HoofCareUnLtd. and Dr. H. Strasser

Text: Dr. Robert Cook and Claudia Garner

Reality Check

A horse is about the biggest most common luxury animal you can own.

He needs a lot of understanding from the owner, manager and all additional parties involved in his care. They were not kidding when they said the purchase price was the least of your expenses.

Certainly you want to board at one of the better establishments, or you even put up with a bigger than usual mortgage, because you like to keep your horse “behind the house”.
In order to go anywhere, you need a truck and a trailer, no small feat with gas prices ever rising. Tack, lessons, clinics, and shows, it’s a never ending story: They all cost money. You just hope you can scrape by without having to pay any extras to the veterinarian, not only because you hope that your horse stays well, but a colic, a lameness, or a skin condition can easily run up your veterinarian bill beyond your wildest dreams.

And then there are the professionals whom you absolutely need: The farrier—or natural trimmer, and the equine dentist. For some strange reason many horse owners skimp on these services, trying to pull the appointments farer apart, not scheduling regular visits, somehow thinking this may somehow work itself out.

A severe colic can often be prevented with regular dental check-ups. Many lamenesses can be prevented with correct regular trimming.

Saving on these services is ill advised and will have to be paid later—by the horse. As much as it may now or later hurt your pocket book, overgrown feet and mouth ulcers are very painful to the horse.

The regular care you afford them in both of these service area will prevent a lot of troubles later on.

Your horse is a large investment, the longer you can keep him serviceably sound and in good health all together, the more you preserve your initial investments. Your friend deserves good care.

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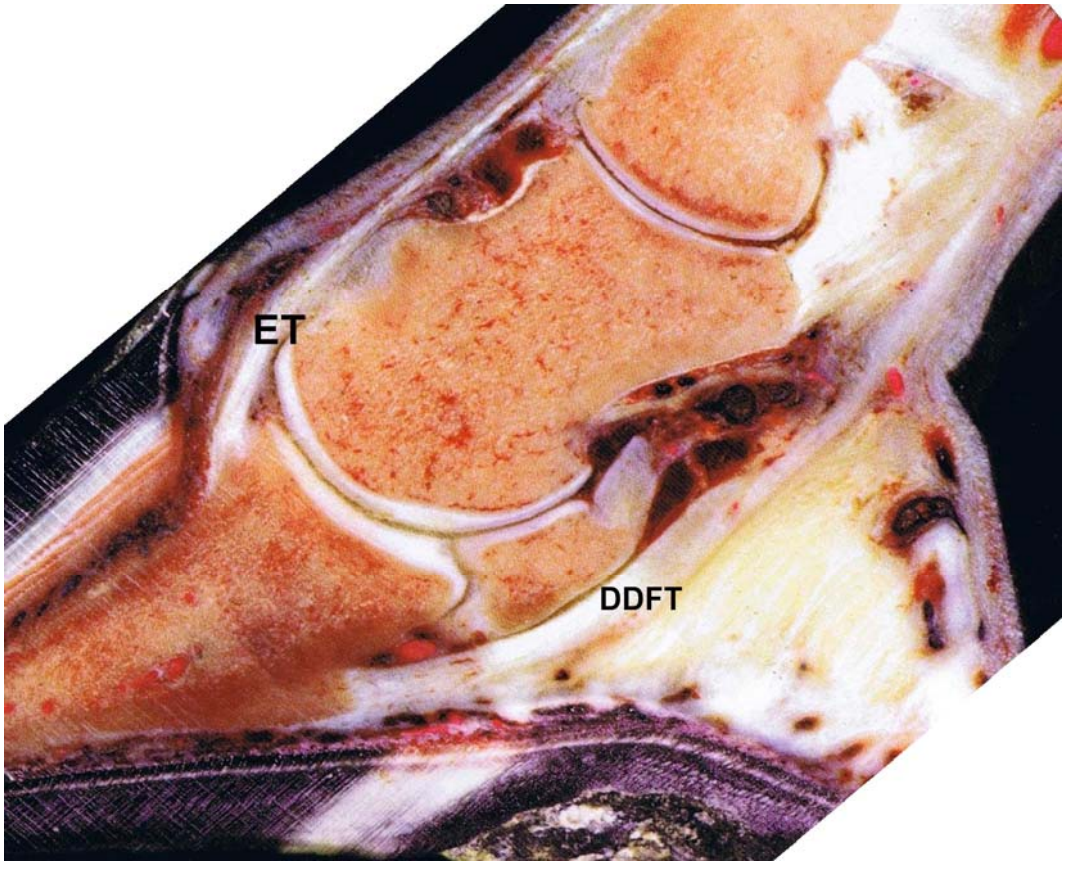
Terminology



ET-Extensor Tendon, connects to the extensor process, also known as pyramidal process of the coffin bone.

DDFT-Deep Digital Flexor Tendon connects to the underside of the coffin bone