Flat Feet?

Part 1

Horses are not born with flat hooves

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Photo 4 - sagittal cut cadaver showing a well grounded frog and good digital cushion.

Horses are prairie animals designed to constantly move large distances, sometimes at speed, so they are built with long legs and tough hooves that are well engineered for such a task.

Their hooves need to be tough enough to provide trauma protection for the foundations of the skeleton (see photo 1 that shows the close proximity of the pedal bone to the ground, even in a good hoof).

They are also architecturally designed to dampen the effects of the downward weight of horse (and rider) versus the ground, firstly through the concave solar surface of the pedal bone (photo 2), and also through the large portion of soft tissue 'landing gear' in the back of the hoof.

When a horse's hoof strikes the ground and fully loads under its descending body weight, the lower leg flexes through both the suspensory apparatus (visible as the dropping fetlock) and the hoof itself (photo 3).

The pedal bone itself forms the front half of a larger internal dome, so it does not sit parallel to the ground surface when viewed from the side, but the rear of the bone is lifted 3 to 5 degrees higher than the front.

The other half of the dome is formed by the soft tissues in the back half of the hoof (the 'caudal' hoof) which double as a sling sitting directly underneath the centre of gravity of the bony column.

There are two vital components of the sling, starting with the frog which needs to be solid 'rubber' that is ground weightbearing its entire length and secondly through the digital cushion which needs to be thick and made of ropey fibre cartilage (photo 4).

To be able to support the descending weight of a horse, not just the majority of time when a horse is merely standing on its 'pins' 24/7, but more importantly when a horse is moving at speed and the pressures generated by a long legged, single toed animal are enormous (it has been estimated that the pressure within the hooves of a galloping thoroughbred exceed 1000 psi – when 40 psi is adequate to support the weight of your float pulling four wheel drive vehicle!), there needs to be substantial and physiologically correct development in the caudal hoof.

That would be a concave hoof!

What happens when the caudal hoof is not good enough to support the internal dome?

If the frog is not solid or fully weightbearing, or the digital cartilage remains the fatty tissue a horse is born with, it is unlikely the caudal hoof will be able to support the boney column to form a dome, resulting in a flat hoof.

In a flat hoof, the delicate palmar processes of the pedal bone are too close to the ground and therefore more susceptible to trauma and without an internal dome, there is no scope for the hoof to vertically flex under loading.

Is this the reason why horses with ground parallel pedal bones and therefore 'collapsed arches' are virtually always uncomfortable and braced when moving at any speed beyond a walk?

Flat hooves are susceptible to many serious lameness issues, including pedal osteitis, navicular syndrome and even fractures of the pedal bone itself.

What about protecting flat hooves?

The logical answer would be to put on a shoe that effectively lifts the sole from the ground and protects the delicate pedal bone. There is certainly some short term merit to doing this in order to maximize the comfort levels of horses working on tough terrain (although there is mounting evidence suggesting that the blood

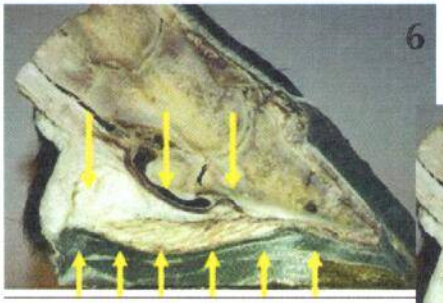
Photo 5 – hoof wear marks on a shoe.

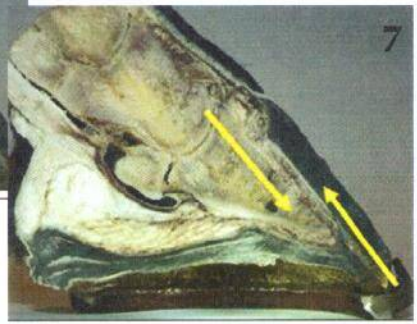
flow disruption from weightbearing only on the hoof wall is effectively anaesthetizing the hooves).

Benefits from shoeing flat hooves can only ever be short term because it is just propping up dodgy foundations; dealing with the symptoms but not the underlying cause.

Shoeing can actually be a contraindication for managing flat hooves because it is not only a primary cause for horses having flat hooves, but it makes the problem progressively worse, firstly through the frictional interaction between the hoof 'rubbing' on the shoe (photo 5), but also because of the tendency of frogs on shod hooves to prolapse towards the ground surface which effectively crushes the heels.

The long term effect of shoes is fairly predictable due to the constant effect of gravity pushing down on a hoof that is not supported under the boney column by the frog and digital cushion (photos 6 and 7).





If you are shoeing your horse to 'lift' flat hooves off the ground, shoe only when needed, not all year round. Maybe investigate some of the plastic shoe options available now, that have wide frog support bars.

What about 'sculpturing' hooves?

You can't simply cut concavity to overcome flat hooves. It may appear better from an architectural perspective to create an arch with a hoof knife, but such a regime of trimming is purely illusional. It is illogical to think that a horse with a purposefully thinned sole and carved frog can be expected to slam its hooves into tough terrain when layers of vital protection have been removed.

Any carving of concavity is weakening the foundations and leading to further collapse of the internal structures.

The answer to flat hooves ultimately lies with developing the caudal hoof to lift the back of the pedal bone off the ground and propagate the vital internal dome.

Our next article will cover caudal hoof development.

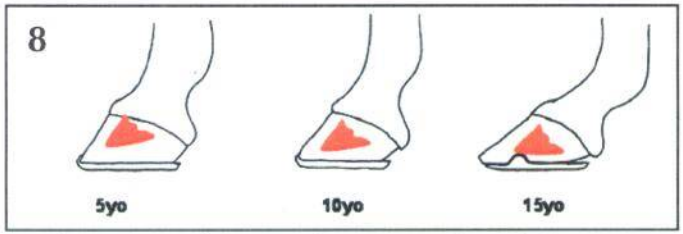


Photo 8 - typical downward migration of the pedal bone over a life time of shoeing that results in flat hooves.