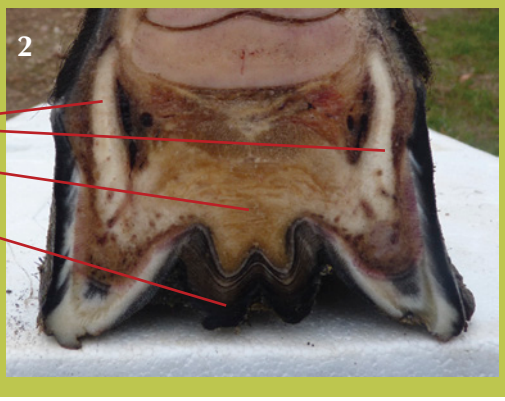
# Caudal Hoof Development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*A healthy, fully functioning caudal hoof is absolutely vital for a horse's long term soundness.*

*Development of the caudal hoof starts when the foal hits the ground, and is stimulated by movement and a weightbearing frog.*

*But can poorly developed caudal hooves be improved in mature horses?*

## The caudal hoof

The back half of the equine hoof is called the caudal hoof.

There are no bones in the caudal hoof, only soft tissue, which is quite a paradox, because the caudal hoof is not only responsible for supporting the entire boney column and elevating the back of the pedal bone to form an internal arch, it also needs to flex significantly to dissipate energy.

This is all part of the great equine design that allows the horse to move at sustained speed over hard ground without breaking down.

The caudal hoof has a big task and needs to be well developed.

Horses with well developed caudal hoof structures and 'concave' hooves are known to have less clinical evidence of pathologies such as navicular syndrome, sidebone, even coffin joint degradation, compared to those horses which have poor caudal hoof development and flat hooves.

The photos 1 & 2 shown at the top are of cadavers from the side, and also from the rear, showing the components of the caudal hoof.

Caudal hoof development begins the very moment a foal first stands on its wobbly legs and full transition to maturity isn't complete until at least five years of age and often longer.

## The Frog

The only externally visible component of the caudal hoof is the frog, so we should see it as a window and a gauge to the health of the caudal hoof.


The frog is a wedge shaped structure that needs to be a big slice of the pie, wide at the heels and extending for at least two thirds the ground weight bearing length of the hoof (image 3).

It must be entirely weightbearing at every step, either directly when a horse is standing on hard ground, or indirectly when a horse is standing on soft ground with its hooves sinking in.

The frog consists of keratin and is a structure that defies engineering principles because it is soft and pliable, yet it also has incredible abrasion resistance when healthy.

## Lateral cartilages

The lateral cartilages are tightly attached to the rear of the pedal bone, appearing almost like extensions from it. They are flexible but supportive so they need to be thick and robust. In a healthy horse, the lateral cartilages are up to a quarter of the total width of the caudal hoof. The thicker they are, the more they are able to participate in concussion absorption.

## The Digital Cushion

The digital cushion is a mass of very flexible 'rubbery' tissue that sits above the frog where it is sandwiched between the lateral cartilages. It extends from the rear of the hoof all the way to under the attachment of the deep flexor tendon to the pedal bone, basically the whole length of the frog.

The digital cushion is highly specialized type of tissue known as myxoid tissue, which is able to fully change its structure over time from adipose (fat) to fibre cartilage. These changes occur as a horse matures.


Foals are born with a digital cushion that is predominantly fatty tissue with isolated collagen bundles. This morphs into a tough network of coarse collagen bundles that effectively form a sling of fibre cartilage.

Ultimately, both the lateral cartilages and the digital cushion unite to form a complete sling. As the body weight of a growing horse increases, the sling needs to get stronger.

When viewed from behind (image 4), a healthy caudal hoof should appear thick and well rounded, not unlike plump fruit just off the tree.

## What can be done to help develop the caudal hoof in young horses?

Development of the caudal hoof starts the very moment a foal hits the ground running and is ongoing. However, development doesn't proceed with age alone - Development requires movement.

Hoof management should focus on keeping the frog healthy and well grounded. Any trimming of the frog should be judicious and only for infection control.

If you have a young horse living in muddy or tropical conditions, any frog infection should be proactively controlled.

The hooves should also be regularly maintained so the length of wall doesn't get too long and take the frog away from weightbearing.

Unless foals are running in rough terrain, they need to be trimmed regularly.

It is very important that horses are not shod too young. Even if you are ultimately going to be shoeing your horse for performance, shoeing should be delayed until after about 5 years of age when the caudal hoof has developed. If you have a younger horse under saddle, maybe you can consider starting with 'tips' that protect the toe but still allow the frog to remain on the ground.

If you take the frog off the ground, development stops.

## What can be done for older horses with poorly developed caudal hooves?

A mature horse with flat hooves is not necessarily beyond help, even though the window of opportunity for lateral cartilage development has closed. This is because the mixoid tissue in the digital cushion retains at least some ability to change structure; it just needs to be stimulated.

Stimulation comes through movement. The majority of a horse's movement doesn't come through the one hour of riding that you may be able to get in every day (if you're lucky!), it is what the horse is doing the other 23 hours of the day that matters the most.

A horse's living quarters therefore need to allow and also encourage a horse's natural inclination to keep moving.

If the frog is non-weightbearing, the ground surface needs to conform to the shape of the hoof. A good way to achieve this end is to keep a horse overnight in a yard of deep footing such as pea sized river pebbles.

A conformable surface can also be taken along for a ride by using hoof boots with soft rubber foam pads.

If a horse is too old for any significant improvement, thick supportive pads may even be used to hold up the internal arch when hooves are under the added stress of saddle and rider.

The problem of flat hooves is often exacerbated by soles that are too thin, so the concluding article in this series will discuss the management of thin soles, which is a very common ailment of the performance horse.


*(photo courtesy of Easycare Downunder)*

References:

The background research and hoof management protocol that this article is based on is derived from the teachings of Professor Robert Bowker, head of the anatomy faculty at Michigan State University, who travels annually to Australia to lecture students studying the Diploma in Equine Podiotherapy. For further information visit: www.coronavistaequinecenter.com, and www.equinepodiotherapy.com.au


*If you have a young horse under saddle you may consider starting him in 'tips' that protect the toe but unlike shoes, still allow the frog to remain on the ground, and continue to encourage the development of a healthy functional caudal hoof*