

The Environment and its Effect on the Hoof Capsule

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All year long British Farriers strive to cope with constant changes in hoof shape and quality depending on the season. We are very seldom happy with the hoof shape and condition, too wet, too dry, no frog, no sole, walls eroded, the list goes on.

To understand what is going wrong with a great majority of horses' feet we should look at how they are formed, grow and are attached to the rest of the animal

The outer hoof is made of horn which comprises carbon, hydrogen, nitrogen, oxygen and sulphur in various proportions. This horn surrounds a bone, called the pedal or coffin bone, which, in conjunction with the short pastern and navicular bones, forms the most distal joint of the limb, known as the coffin joint. The attachment of the hoof to the coffin bone is via a mesh of laminae.



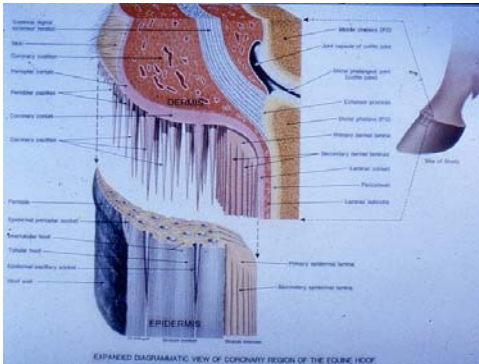
A good solid hoof

Two types of laminae exist: those which surround the outer surface of the coffin bone are called dermal or sensitive laminae and those on the inner border of the hoof wall are known as epidermal or insensitive laminae. These two sets of laminae dove-tail together and it is this laminar bonding which actually holds the horse in suspension and acts as part of the shock absorption mechanism within the hoof.

The Parts of the Hoof

The hoof is made up several various sections of horn, each of which performs a unique function in the protection, shock absorption and locomotion of the horse. The elasticity of the hoof depends on the moisture content of each of its sections.

The wall is the visible outer portion and comprises three layers, namely outer, middle and inner. Their anatomical names are Stratum Tectorium, Medium and Germinativum. In feral horses the wall wears by friction with the ground.



The wall grows from a structure called the coronary band, which is situated proximal (at the top) of the hoof where it joins the skin. The coronary band comprises of coronary corium or papillae (little cone like structures) each of which forms a tubule of horn which, through cellular division, causes the hoof to grow downwards parallel to the laminae.

The Coronary Band

Nourishment of the wall comes via blood supplied to the coronary corium. Each section of the hoof has its own corium from where it is grows.

Directly above the coronary band is the periople which has the function of creating a protective outer layer on the hoof wall.

The bars are a continuation of the wall whose function is to strengthen the heels and help shock absorption.



Puncture wound on a thin sole

The sole covers the bottom of the hoof and is joined to the wall at the white line. The horn tubules in the sole turn back on themselves resulting in a healthy sole exfoliating in large flakes under “NORMAL” conditions. The sole is a non-weight bearing structure except for around its junction with the wall.

The frog is the triangular mass of soft horn situated in the back third of the solar surface.

It regenerates itself and will detach intact under perfect conditions. Its function is to prevent slipping and act as an auxiliary blood pump during locomotion. It operates in conjunction with the digital cushion which is a mirror image of the frog and is positioned directly above it. The digital cushion becomes compressed in a low heel situation, but will return to normal if it can be unloaded.



Eroded wall before trimming and shoeing



The same hoof after shoeing

Situated on either side just above the digital cushion are the collateral cartilages, whose function is supporting the coffin joint and shock absorption.

The Effects of the Environment

It is impossible to generalise as to the effect of the terrain on the horse's external hoof. I can only relate some of my personal observations of hooves in my area. I will try to describe my observations of horn quality found in the hooves of my equine clients.

It seems no accident that my best footed horses are those who have the least amount of turnout. The heels are stronger, walls are thicker, and overall external hoof condition is good. I have noticed a considerable deterioration in heel height and horn quality in those horses either living out full time or out for daytime and in at night.

I have no doubt that research into hoof horn deficiency prove that certain vitamins and minerals are lacking in horses with poor horn growth, but my observations have found that if a horse with poor quality hooves is brought indoors, fed a hoof supplement and has the hooves moisturised daily. Within a very short period of time an improvement is noticed.

Conversely, I have also seen that just feeding a hoof supplement without changing the environment can have little or no effect, often leading to negative feedback on the particular hoof supplement.

In summer, which for us, in south west Scotland, usually means the three nice days in May, feet in horses turned out 24/7 can become too dry, and when combined with constant movement of the hoof trying to avoid midges and flies, nails can break in shod hooves leading to lost shoes. Whilst in the unshod feet the wall can become chipped and broken when walking on hard ground.

In my area dry hard conditions are rare. Normality for me is trying to support heels and keep toes short without leaving a shoe longer than the hoof which could be caught and lost



Hooves showing very little sound wall for nails to be driven into.

As I have already indicated, the wall wears naturally by the friction created by contact with the ground. Imagine what is happening to the hoof wall when, with every stride the

hoof sinks its full wall length into soft ground in the field. The analogy would be to liken the movement to having medium grade sandpaper rubbed constantly on the hoof wall and sole.



Instead of just the lower border of the wall wearing and keeping the horse naturally balanced the whole wall is eroded, leading to a weakened hoof.

A shod foot with a pad

Should the sole become thin, then walking on even the smallest stones will cause discomfort, leading to bruised soles and lameness. Either an acrylic sole has to be glued on or shoes have to be fitted with pads to correct this

Often an owner is worried about the appearance of fine vertical lines on the hoof wall. A primary cause for this is the excessive passage of moisture within the hoof leading to

slight stress fractures of the wall A prime example of this is regularly bringing in a wet footed horse into a lovely dry shavings bed The moisture content of the hoof can go from a soggy 45% to a dry 17% overnight, if no external moisturising protection, in the form of hoof grease, is applied.



The same situations arise when horses are constantly ridden on abrasive arena surfaces. I have noticed significant erosion on the front of the hooves especially on the hind legs due to the way they flex and extend during forward movement

A sprung shoe

In shod horses kept predominantly outside I often see the foot surface of an old shoe with a groove worn into it due to the friction created between the young horn at the heel and the foot surface of the shoe. This leads to more heels being eroded than grown.

I have noticed an improvement in hoof quality if I can persuade an owner to apply hoof grease twice daily to a turned out horse, my theory being that it will take a few minutes of exercise to wear off the protective barrier. If the same management is applied to a poor footed horse which spends 50% less time in pasture than previously, the feet will improve significantly.

In conclusion, I would advise all owners to closely monitor the external condition of the hooves, and be proactive in anticipating wall erosion or wall splitting before a problem occurs.

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