How Kohnke's Own Hoof Seal Works

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Special
Fact Sheet 6

The hoof obtains moisture for deeper structures and the lamellae from its blood supply. The outer keratin tubules are like hair - they absorb moisture from the ground surface and expand to keep the hoof wall and sole flexible and resilient.

Much of the moisture in the hoof wall is lost from the vertical tubules as they contact the ground surface, where the tubules act as capillaries to absorb moisture and also lose it by the reverse flow under dry conditions. The sole and frog are also at risk of losing moisture through its short vertical tubules as well.

The hoof wall and sole dehydrates and cracks very quickly if the ground surface is dry. This occurs commonly on dry sandy soil during the summer months, where the soles and edges of the hoof wall sink in and are surrounded by dry, absorbent sand which draws moisture from the hoof wall and sole tubules. As the hoof wall and sole dehydrate, they shrink slightly like a piece of wood as they dry out, causing small cracks and separation of the hoof wall-sole junction on the ground surface interface. The internal lamellae do not separate due to dehydration to the same extent, as laminitic inflammation and reduced lamellae bonding cause internal separation, such as occurs in laminitis due to altered blood perfusion.

The hoof has an internal moisture membrane on the internal surface of the sole tubules and germinal corium.

This 'barrier' prevents bacteria and micro-organisms from gaining entry to the corium and lamellae.

However, severe dehydration of the tubules and shrinkage can compromise this internal barrier and infection can gain access to deeper hoof structures. Obviously, penetrating objects, such as hoof nails can perforate this membrane barrier and infection can enter the hoof. Deep cracks into the sole tubules, or bruises to the corium from sharp stones etc, increase the 'stress' on the barrier and the likelihood of it failing its protective function. This often happens when the hoof dries out and the sole cracks, and then wet weather solubilises the 'microbial' flora. They can gain entry to deeper structures by the capillary action as water is absorbed if the membrane and hoof wall-sole lamellae junction have lost their protective barrier function due to minute fissures in the barrier. This is the early progression of a hoof abscess under the sole.

If the hooves are severely cracked around the edges, especially due to hot dry soil or absorbent sand ground contact surfaces, then there is a risk that even trying to re-moisturise the sole and hoof wall interface to rehydrate the tubules, may allow microbial flora to gain easier access to the deeper hoof structures.

In this case, if you wish to rehydrate the hoof tubules etc, or in the advent of wet weather after a dry period, it is best to try to avoid bacterial access to the deeper structures by scrubbing and flooding the soles of horses with severely cracked or broken away hoof wall edges with 10% Betadine solution. Give it time to be drawn into the hoof and the deeper structures to limit bacterial populations and reduce the risk of them gaining access through the compromised barrier membrane. Betadine 10% can be liberally painted on the allow it soak into the sole tubules and it will retain antimicrobial action, including antifungal activity, for some time as the iodine is slowly released from the PVP complex to sustain its activity.

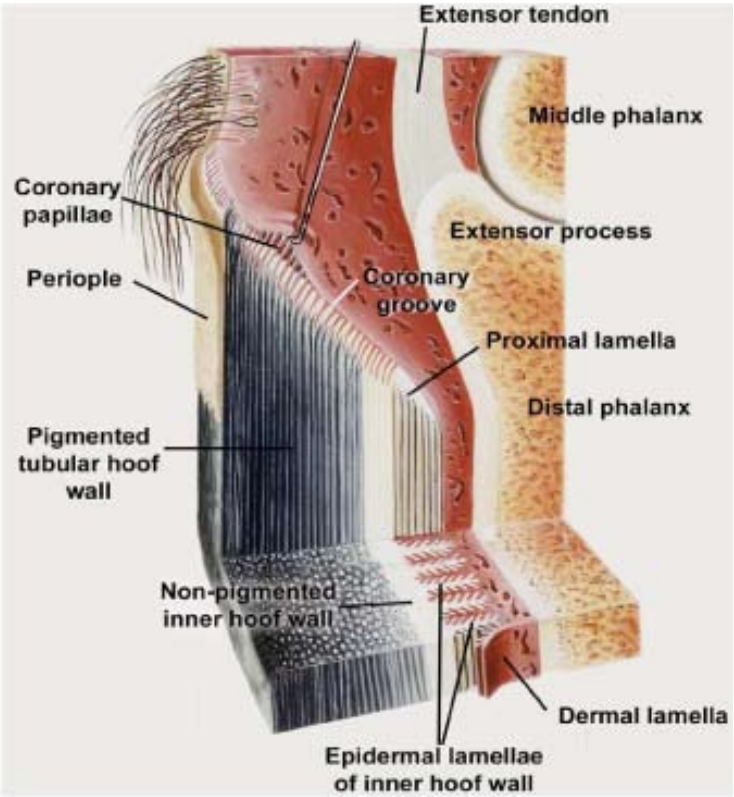

Diagram showing the tubular anatomy of the hoof wall and inner structures of the hoof. Design Chris Pollitt, Artwork John McDougall

Topical hoof preparations

The theory is that topical hoof preparations provide an external physical protective film to act as a primary barrier against moisture loss and microbial invasion.

Theoretically, they should act as the first or primary external barrier or line of defence to assist the natural internal barrier membrane in its role in protecting the internal hoof structures.

Ideally, hoof creams and paints need to stay as a coating or protective film on the hoof wall and sole and resist water wash off, physical removal by abrasion on the ground surface and melting as the hooves warm to 41°C during exercise.

This is a difficult function for many of them to retain their barrier function for more than a few hours as a coating on the hoof wall and sole, because of the risk of them being removed so easily if they are not bonded to the hoof wall and sole in some way.

There are a lot of claims and counter claims for different preparations. Many are based on cheap animal fats or grease, including lanolin, which melt at 34°C and lose their protective function, can be washed off and also wear off the hoof surface as the horse walks around or is worked. Lanolin does hold 3 times its weight of water, but it melts so easily at temps above 35°C, that it is removed very quickly. Some are medicated to try to reduce surface bacterial flora, but they wear or melt off quickly and lose their intended benefit. Others contain moisture binding substances, such as clay, to try to retain moisture on the hoof surface, but of course, they wear off and are washed off quickly after application on wet grass, working surfaces and during wet weather. They sort

of smother the hoof wall just like a mud. A very few topical hoof preparations contain pine oils and resins which adhere and are more resistant to heat, water and wear and tear.

Theory of Hoof-Seal

Hoof-Seal contains pine wood tar (known as Stockholm tar from European pine forests - it is a biodegradable natural wood tar, not a petroleum tar), wood pine oil (a more liquid fraction of wood tar distilled out of pine tar which mixes to thin the Stockholm tar so that it can be applied more easily and actually dries on the hoof surface to form a thin film and barrier) and small amount of special biodegradable polyurethane. This mixes into the tar and oil and acts to provide a thin resistant film of protective oils which actually provide a breathable coat to allow moisture to escape and enter the hoof tubules to help maintain normal moisture levels and prevent large variations in wet and dry weather. The polyurethane, when examined microscopically, has a porous, mesh-like micro-structure which acts as a primary anti-microbial barrier as well. It is not totally water soluble and doesn't melt off at normal ground surface temperatures. The polyurethane hardens the pine oil mix to form a film to resist abrasion and wear of the coating for up to 7 days.

A study in the late 1980s to early 1990s, published in the American Association of Equine Practitioners (AAEP) Proceedings, concluded that natural pine tar combinations were the most effective at preventing moisture loss when compared with animal fats and resins.

Hoof-Seal doesn't fully seal the hooves, but acts as a moisture limiting primary barrier to minimise excess water uptake and softening of the hooves in wet weather, and minimise drying out in hot, dry conditions. It doesn't wash off or collect soil and bedding.

When first applying Hoof-Seal, start with 2-3 applications per week and then in most cases, once a week applications are adequate to help maintain the normal moisture content of the hoof wall and sole.

In the case where hooves are deeply fissured around the ground surface border, and surface and sand cracks are evident on the hoof wall, I recommend that the cracks be cleaned out, swabbed with metho to remove oils and then sealed with silastic bathroom sealant. See box at right.

Using Hoof-Seal on Cracked Hooves

I normally suggest that the dry, cracked hoof wall edges and soles be scrubbed and flooded with 10% Betadine, allowed to penetrate for 15-20 minutes, and then apply the Hoof-Seal as a coating and allow it to dry. This procedure is repeated every 2-3 days for a week in severely cracked and compromised hooves. After a couple of floods with Betadine, then the horse's hooves can be hosed or stood on a clean wet surface to allow water uptake into the tubules prior to painting on a thin film of the Hoof-Seal.

Sealing Hoof Cracks

Hoof wall splits and quarter cracks can be difficult to manage in a horse. Continued build-up of soil and sand within the crack can wedge open as the hoof quarters expand at each footfall, even in horses with barefoot trimming.

Where a 'sand' crack opens up from the ground edge of the hoof wall, trimming the hoof and even applying a shoe, also to the adjacent hoof front or back hoof may help to stabilse the crack. To prevent sand compacting into the cracks, I have had great success by filling them with silastic window /bathroom sealant. Simply brush out the sand and carefully pick it out from the depths of the crack with a hoof nail. Then apply 10% Betadine iodine solution to limit microbial contamination by allowing it to soak for 10 minutes before applying the silastic sealant. Swab the crack and the surrounding hoof wall area with methylated spirits to remove moisture and fat residues. Apply a small amount of dishwashing liquid to the tip of your index finger, or apply latex or thin vinyl gloves, to prevent the sealant sticking to your skin. Smear the silastic window/bathroom sealant into the split or crack and then smooth it over to ensure that it is level and smoothed over the hoof wall bordering the crack. Stand the horse on a concrete surface with hay to eat for 10-15 minutes until the sealant cures, or alternatively, wrap a layer of kitchen film (eg Glad-Wrap®) over the hoof to prevent the sealant being contaminated while it cures. The sealant will usually remain in place for weeks, but you may need to strip it out and replace it once a week as the crack grows out.