

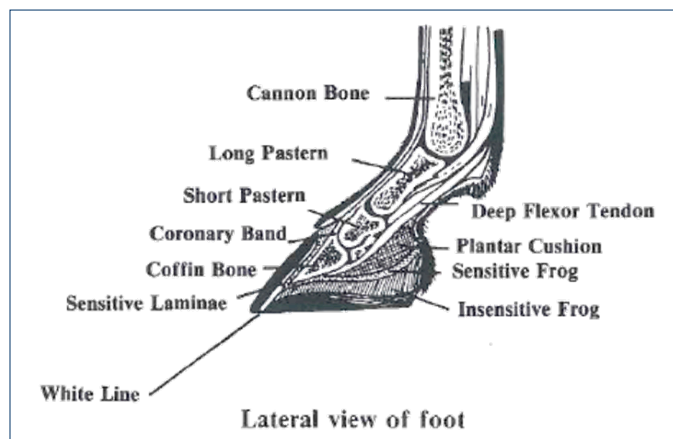
Basic Equine Hoof Care

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Hoof Anatomy

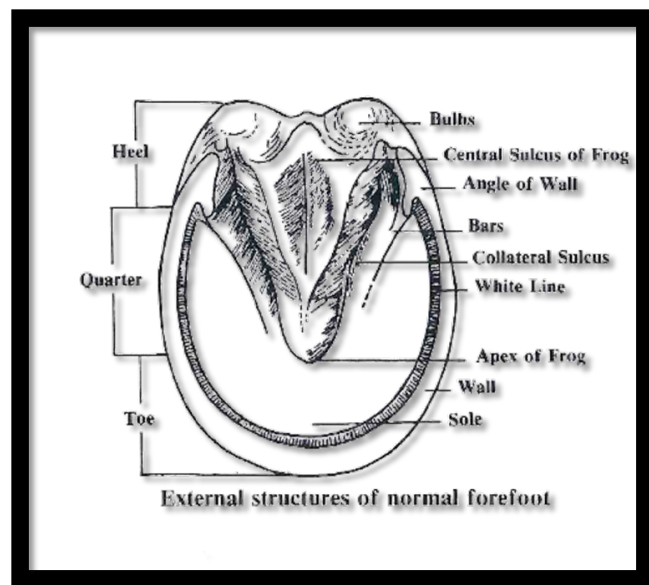
The strength of the chain is always limited by its weakest link, and in many regards the lower leg and foot may be the horse's "weak link". Understanding the function of the foot and its management can improve its reliability.

The horny hoof wall is composed mainly of epithelia cells that have been keratinized. These cells grow out of the coronary band in tubules that are perpendicular to the ground and ultimately form the weight-bearing structure. The outer surface of the hoof wall is covered by a wax-like stratum tectorium that seals and helps conserve moisture within the hoof; so, avoid removing this protective surface by sanding or rasping.



Inside the hoof wall, the insensitive laminae attach to the wall on the outside and intermesh with the sensitive laminae to the inside. These leaf-like structures then attach to the third phalanx or coffin bone which gives the foot its shape. On the weight-bearing surface, the white line separates the hoof wall from the sole. The sole tubules curl near the ground in such a way that, as they do curl, they die. Thus, the sole has a self-limiting growth pattern, and the dead insensitive tissue helps protect the sensitive tissue underneath.

As one would imagine, the sole is concave to the ground. The elastic wedge-shaped mass under the heel is known as the frog. The frog compresses when weight



is transferred to that leg and is an integral part of the horse's shock absorption system. The column of bones in the horse's leg is classic model of shock absorption. The first phalanx or long pastern bone is the beginning of the lower end of the column and connects with the second phalanx (P2) or short pastern bone. The third phalanx (P3) or the coffin bone extends its wings around both sides of the foot, and its porous nature allows great quantities of blood to bathe the area. The short pastern bone sits partially in the hoof and above it. The notorious navicular bone is the smallest bone of the foot and serves to increase the movement of the distal interphalangeal coffin joint.

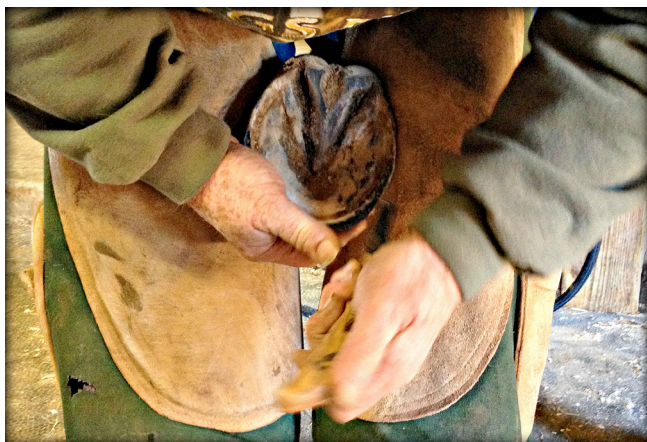
As the foot strikes the ground, the heels are expanded by the frog's pushing upward; this in turn compresses the plantar cushion up and out against the hoof wall and lateral cartilages. As this happens, the blood veins draining are compressed, and the pooled blood then acts as a hydraulic cushion as well as starting the blood back up the leg. The coffin bone descends slightly within its surrounding layer of sensitive laminae to help in the absorption of this concussion. The navicular bone also gives slightly to absorb its share of the shock as the weight is transferred to P2 to P3.



Excess hoof growth is removed with nippers



The hoof wall is filed smooth with a rasp.



The hoof knife being used to trim the sole and maintain the concave shape

Care and Trimming

Maintaining the foot in a condition that does not inhibit the horse requires some forethought. The hoof wall needs to be kept in a smooth weight-bearing surface. This means that the $\frac{1}{4}$ to $\frac{1}{2}$ inch of monthly growth will need to be trimmed away or, if it is wearing too rapidly, protected with a set of shoes. The sole also will need to be trimmed periodically so that it remains below the weight-bearing surfaces but never thin enough to bruise easily.

Several factors affect the rate at which the hoof regrows; and depending on these factors, the hoof may need trimmed anywhere between a 5 to 12 week interval.

Factors include:

1. Age of the horse- hooves of younger horses grow faster than older horses.
2. Climatic conditions- hoof growth slows during colder winter months.
3. Nutrition- horses with nutritional deficiencies will grow weaker, less flexible hoof than those with an adequate nutrient supply.
4. Terrain and/or housing conditions- more natural wear on the foot will occur in horses housed in rocky or hard-terrain pastures compared to softly bedded stalls or paddocks with a sandier soil.
5. Exercise- exercise also promotes healthy hoof growth.

For many recreational horses, keeping the foot trimmed and level is adequate. Only when horses are being used heavily or ridden in rough rocky terrain do they normally require shoes. Of course, some horses are shod with other than flat shoes to correct problems or to alter natural movement. Trimming the hoof requires some skill that most people can learn and three basic tools- a rasp, nippers and hoof knife. The hoof knife is used to remove some of the sole and trim the frog. The nippers are used to cut away the hoof wall. More of the wall is removed at the toe than the heel. The rasp is then used to smooth the cuts and level the surface. Nailing on shoes requires considerably more skill and practice under the watchful eyes of a trained farrier.

Common Hoof Ailments

Sole or Wall Abscess

An abscess is an infection that occurs between the inner surface of the hoof capsule and the bone. The infection originates when bacteria is introduced through the hoof capsule or sole, often through trauma, a blemish or softening of the hoof wall. Trauma can occur if the horse steps on a nail or piece of glass, where softening of the hoof wall is most often caused during wet weather conditions or when standing in wet dirty stalls for prolonged periods.

This type of foot ailment is the most common cause of a sudden onset of lameness. The pain experienced by the horse is due to the pressure created by the abscess under the hoof wall. Oftentimes, heat can also be felt in hoof and the pulse taken at the pastern will be stronger and more easily detected.

Treatment

Treatment focuses on drawing the infection to the sole surface (often by soaking the foot) so that it can drain. A veterinarian may also pare a small hole to relieve the pressure and allow drainage if they are able to locate the site of infection. If left untreated, the abscess can migrate up the inside of the hoof wall and rupture along the coronet band. Although pain is almost instantly relieved after the abscess has ruptured, one that ruptures along the coronet is harder to flush and treat further.

Thrush

Thrush is the most common infection of the hoof and occurs in frog cleft (central sulcus) and collateral grooves or sulcus, which run along each side of the frog (see diagram on page 1). Thrush has a characteristic odor and presence of black or gray discharge/decaying tissue. The frog will be softer, sometimes tender to touch and prone to tear. The infection can be caused by similar wet and/dirty conditions that cause abscesses; however, in this case, the infection does not penetrate the hoof wall. Severe thrush can cause a deepening of the central cleft up to 1/4 -1/2 inch, and a puss or bloody discharge occurs when a hoof pick is used to clean this area.

Treatment

Simple but persistent treatment is necessary and involves the delivery of any disinfectant deep into the sulcus. This can be done by one of two ways. The first involves soaking a small cotton round with a disinfectant like Coppertox or Betadine and wedging it into the central cleft with a hoof pick. By pushing the cotton all the way into the central sulcus, the medication is able to reach and act on the deepest part of the infected frog. This treatment should be done for seven days, then wait seven days and retreat until healed.

Another option utilizes topical antibiotic gel that is typically used for treatment of mastitis in cattle. The long application tip made for pushing the gel up into the teat makes it easy to ensure the medication reaches the bottom of the frog cleft. Again, it should be treated for several days until the infection has completely healed and the depth of frog cleft has returned to normal.

Laminitis (Founder)

Laminitis is a systemic disease that manifests in horses' feet. It occurs when the laminae beneath the hoof wall weaken and in severe cases, separate from the coffin bone (final bone in horse's leg), causing loss of the foot's mechanical integrity and significant pain and lameness. Mild episodes of laminitis can be confused with sole bruising, arthritis, or foot soreness following trimming or shoeing.

In the case of laminitis, the focus should remain on prevention rather than treatment. Since one proposed mechanism involves digestive and metabolic disturbances by the over consumption of carbohydrates from grain or lush pasture grasses, proper feeding management practices should always be followed. Care should be taken to excessive grain intake, which could overload the horse's digestive system with rapidly fermentable carbohydrates. The acidic conditions caused by excessive microbial fermentation is responsible for systemic inflammation and resulting laminitis. The same care should be taken when introducing horses to a new diet or pasture to avoid digestive disturbances.

Once laminitis is diagnosed by your veterinarian, treatment involves careful and coordinated therapies between your vet and farrier to prevent further damage to the laminae.



A severe laminitis case in which separation of the coffin bone from the hoof capsule, followed by mechanical failure and downward rotation is evident.

Summary

These three are the most common equine hoof conditions that can be prevented or treated with proper management; however, there are several others that often have similar symptoms. It is always best to get a diagnosis when a foot problem arises to ensure its being treated most effectively. You as the horse owner should have a basic understanding of hoof anatomy, nutritional needs of the hoof, routine trimming needs, and hoof care programs so that you can best maintain the health and functionality of your horses' feet.

References

"Thrush (or Pododermatitis)". NC State University College of Veterinary Medicine. <http://www.cvm.ncsu.edu/vhc/sfs/ehc-sp/ehic/thrush.html>

Adapted from "HORSES: Hoof Care". Clemson Cooperative Extension Fact Sheet. March 1985.