Foal Hoof Management

Part 2: Setting Foundations

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There is more – much more – to the story of foal hoof management than simply growing legs straight enough to pass muster at the yearling sales or breed shows.

Granted, the importance of straight legs to support and keep a horse working under saddle can't and shouldn't be ignored, but it's the actual morphological and physiological development of the hooves from foal to adult that allows a horse to reach its full athletic potential and sets the foundations for life long soundness.

From birth to maturity, equine hooves undergo massive and all-encompassing change.

The study of foal hoof development - the growing of a 'good' hoof - is concerned with optimising such changes, and needs to consider both the spatial arrangement and relative size of the individual components of the equine hoof, and also the structure and composition of the tissue that makes up each anatomical unit.

It is a lot more intangible than simple geometric leg conformation.

Such study also unlocks clues to the underlying morphological differences between the all-terrain-gravel-crunching-barefoot horse and the can't-go-anywhere-without-shoes gimpy horse.

Foal hoof development starts very soon after birth when the newborn determinedly begins to stand on its ridiculously long, spider legs. Foals are up and about incredibly quickly.

The very existence of the equine species has relied on the ability of this prey animal to flee predators from the moment of birth. Have you noticed that even the quietest mare in the mob will 'cut laps' around her paddock as soon as she and her new foal are up from birth. If the gate was open, she would take her foal to the furthest corner she could find.

This early movement of foals has been part of the equine script for millions of years. It is a vital part of the evolutionary survival plan (quick, get the newborn far away from the betraying scent of the after birth) and is still a physiological requirement for the modern domestic horse (5,000 years of domestication is not even a blip on the radar of 60,000,000 years of evolution).

Movement stimulates and stresses, which drives tissue change and development. In fact, the amount of stimulation (read 'movement') that a foal's hooves receive in the first months of life will partially determine their ultimate size and strength relative to the body above. Bigger and stronger is always better when it comes to a horse's landing gear, especially when its workload includes carrying the weight of a rider and saddle.

As an aside, have you ever wondered how front hooves (and the pedal bones inside) come to be round in shape when they are the same spade shape as the hinds at birth? Stimulation through movement.

Frog

The soft hoof coverings that a foal is born with immediately wear off to expose the frogs, which begin to toughen as they take up the role of weight-bearing and, from the outset, become the largest component on the ground surface of a baby foal's hooves.

The frog is the landing pad designed specifically for initiating concussion absorption. This is why it is weight-bearing on the ground from the moment a foal first stands up on its wobbly boots and should stay well-grounded forever after.

The frog grows proportionately with the hoof. As the hoof grows, so should the frog. It should always remain a large piece of the pie that is weight-bearing its whole chunky length.

Sole

Whilst the sole is delicately thin and soft at the beginning of a foal's life, it thickens and hardens as bodyweight increases. Ultimately, it needs to be the tough, hard, thick skin that allows a horse to slam its hooves repetitively into hard terrain so that it can get out of the predators' reach, and transverse the great distances required by prairie browsers to source food and water.

In order to reach genetic potential, soles need to be stimulated and stressed from the start.

Could the lack of sustained movement over hard ground in a foal's early days be the missing link preventing so many domestic horses from having soles thick enough to survive ridden life without shoes?

Digital cushion

The digital cushion is the soft internal part of the landing gear, wedged between the frog beneath and the boney column above. It operates by effectively deadening the high frequency shockwave that arises from ground impact, absorbing some of the energy into a myriad of small blood vessels within the cushion itself and directing the remaining shockwave towards the lateral cartilages where it 'disappears' into the blood flowing through the complex venous plexus.

CLOCKWISE:A sagittally cut cadaver showing the digital cushion located between the boney column and frog. A cadaver cross section showing the white lateral cartilages either side of the digital cushion. A healthy hoof with a proportionately large frog. Images courtesy Andrew Bowe, Mayfield Barehoof Care Centre.

A key feature of the equine species is thought to be the presence of myxoid cells within the tissues of the hoof, particularly the digital cushion. These cells have the ability to transform from soft 'mucoid' tissue into robust fibre cartilage.

When a foal is born, the digital cushion is little more than a mass of fatty 'blubber' but, as a foal's bodyweight increases and it moves great distances over firm ground, the myxoid tissue within the cushion begins to morph into strands of fibrous cartilage that provide important support to the myriad of tiny blood vessels that proliferate within.

Lateral cartilages

The lateral cartilages form a sling that surrounds and restrains the much softer digital cushion - much like a complex spring. Whilst paper thin at birth, the lateral cartilages increase greatly in size and in a mature, healthy ('good') hoof are approximately 30% of the total width of the back of the hoof. When fully developed, the sling of cartilage is strong enough to form an internal arch that elevates the rear of the pedal bone, thus ensuring the distal joints are aligned so that they can accommodate the enormous gravitational forces generated by movement.

Blood vessels

Complete function of the equine hoof relies on the constant flow of a massive volume of blood. However, the blood doesn't just barrel straight through the hoof on its journey back to the heart. It is actually retarded so that it is able to absorb the shockwave energy generated by hoof landing, and also act very much like a waterbed to lift and carry the pedal bone above the 'floor' of the sole. Retardation is achieved by the blood needing to pass through a huge number of tiny blood vessels within the digital cushion, lateral cartilages, corium and even the pedal bone itself.

Stimulation of the growing hoof is thought to increase the number and complexity of these micro vessels.

Set the hooves in motion

All of the components of the juvenile hoof are stimulated by flexion, which is promoted by pressure and release, expansion and contraction - movement.

What can you do - the proud owner of a new foal - to kick start the development process?

The best thing to do, very simply, is to get a foal moving from the outset. Make your foaling down paddock safe, but make it as big as practical. As soon as you can, let your mare and foal loose into the largest - and safest - turn out paddock you have at your disposal. Open space ignites the innate desire prairie animals have for moving. Better still, nothing encourages movement more than keeping a foal with other foals. Run around. Drink. Sleep. Run around some more. I can run faster than you!

If you have an 'only' foal, maybe consider finding another mare and foal it can be joined up with. Foals living at the author's farm are lucky enough to have paddock mates and the freedom to move.

If it is possible, have your foal paddock set up so that foals are required to transverse hard terrain, which will stress the hooves. It is quality, as well as quantity, when it comes to movement. The author's foals get to regularly travel rocky creek crossings, which provide great stimulation and stress for developing hooves.

Regular trimming is needed to ensure the frogs stay well-grounded and your foal should first meet the farrier when it is about four weeks old. If a foal is lucky enough to live in a situation that provides enough movement over sufficiently abrasive ground to facilitate self-trimming, then no intervention may be needed. However, at the very least, you will need to teach a young foal to have its hooves picked up so they can be inspected for over-growth.

Whilst continual stimulation should keep the hooves healthy, be sure to regularly clean out dirt plugs, and monitor a foal's frogs for any invasive infection and treat topically if any problems arise, especially in wet or tropical areas.

What not to do

In the quest for provision of the safest possible environment in which to house a newborn foal, owners often keep mares and foals in small, 'secure' yards or stalls with soft bedding. Unfortunately, such confinement and soft footing is diametrically opposite to the physiological requirements of the species. Indeed, prolonged inactivity or continual exposure to soft ground can potentially inhibit hoof development, due to the frog atrophying, leading to shrinkage of the hoof capsule and constriction of the soft pedal bone, ultimately preventing its otherwise rapid expansion.

Such a lack of stress and stimulation may also be the origin of the weak lateral cartilages, scarcity of micro blood vessels, unchanged myxoid tissue and inadequately thin soles that trouble so many domestic horses.

Safety is obviously paramount, but avoid keeping a foal on soft ground or yarded in a situation where it can get little movement.

Be proactive

Apart from providing a stimulating environment for your foal to live in, why not take a leading role in your foal's hoof development and its future health, and learn to maintain its hooves yourself? It's really not that hard (technically or physically) and makes a good excuse to spend more time 'playing' with your foal.

Even if it is only a quick rasp in between visits from a professional (indeed, the author recommends the continued involvement and guidance of a foal experienced hoof trimmer), the benefits of keeping the walls short and the frog well-grounded are far reaching.

Much of this article is based on the research findings of Prof Robert Bowker from Michigan State University who is a world leading equine hoof science researcher. Prof Bowker will be presenting his latest research findings at the 2015 Bowker Lectures, to be held at Pinnacle Valley Resort, near Mansfield, Victoria, February 21-23 (see **www.barehoofcare.com** for more details).