



Water is the source of life... and healthy hooves.....

© Carola Adolf

According to the Farrier and Hoofcare Resource Center, the tough, insensitive parts of the equine hoof, such as the wall horn, solar horn and frog horn have an approximate moisture content of 25% for the wall, 33% for the sole, and 50% for the frog.

(Earlier research (Clement) shows 16.12% for wall, 36% for sole and 42% for frog – so it depends on who does the testing and when and where it's done. There are too many variables to find reliable data.

Since there is very little practical and reliable scientific or even non scientific research into "water and the equine hoof", we shall, for now, have a look at a few arguments derived from observations and the always popular common sense - and tie our findings to the plea (made by wrist-sore hoofcare practitioners mostly of the barefooted kind) to horse owners to PLEASE re-hydrate their horses hooves.



"Re-hydrate my horse's hooves?" you say, "Nobody asked me that before – and besides: We can't waste any water".



Since the informed barefoot community is looking at the example that Nature has provided for us, we try to recommend and implement a hoofcare regime that closely mimics the ideal conditions that wild and feral horses may experience.

We will look at these conditions more closely in a minute.

The great thing about a domestic protocol is that we can take all the good things that Nature has already successfully provided over millions of years and omit the bad (natural predators, lack of nutrition etc.).

Despite having all this inherent knowledge at our disposal we still tend to feel the urge to try and do better than Mother Nature - and with that, we often create problems.

There are many examples of this human ambition to top Nature, but in regard to hoofcare, of course, the first example of an attempt "to improve on Nature" is nailing metal to a living hoof!

Sure, we may protect the hoof wall from excessive wear and provide changed traction and alter the natural limb cycle.... But to those of you who have become interested in their horse's anatomy, physiology and holistic health, the significance of hoof function to the entire organism is paramount and therefore you have recognized without a doubt that trying to improve on Nature in this regard, has never been an improvement to the horse. It has merely enabled us to extended our employment of the horse, as metal shoes somewhat

U
N
O
A
L
L
A
V
O
L
T
A
—
O
N
E

A
T
A

T
I
M
E



allowed us to use it beyond its biological limitations. This in itself has and will always create problems to the horse.

Only a hoof in its natural state and physiologically correct form can be a healthy functioning hoof.

Now, what has all of this got to do with **WATER?**



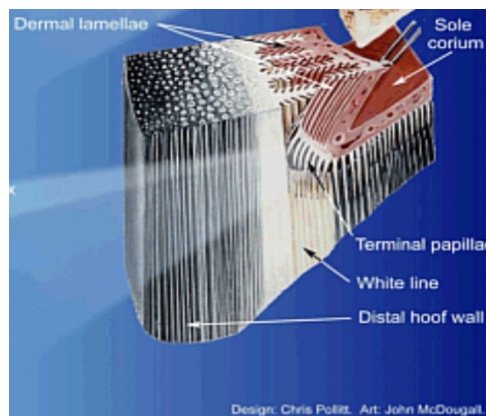
Even though the opening paragraph of this article seems a bit generalized, it gives us important information:

The horn of a natural healthy hoof has significant water content.

Hoof horn, which forms the capsule at the lower part of the legs of many grazing animals including the equids (horses, donkeys and mules, zebras...), is a composite natural material based on keratin. Its function is influenced by the tubular and intertubular material and is modulated by the moisture content.

When trying to implement a healthy hoofcare regime, we need to understand the biomechanical properties of hoof horn and how they are related to structure and function.

Water provides for elasticity of the structural components (moisture retaining keratin tubules, see cross section on right)– and therefore facilitates function and resilience.



A lot of research has been done to the bovine hoof and hydration levels, but for some reason not much attention has been given to the equine hoof on this subject - so scientific research data is scarce and we will just have to employ some observational information for now:



dry and hard = impaired function

A dehydrated hoof is a contracted, rigid, inelastic, very hard, scratch, wear (and trim-) – as well as impact resistant structure, which is exactly what makes it – because it is so hard, rigid and inelastic – a weak shell (or lump) of horn at the end of the horse’s leg.

This shell, the hoof capsule, is supposed to protect the sensitive inner struc-

U
N
O
A
L
L
A
V
O
L
T
A
—
O
N
E
A
T
A
T
I
M
E



tures PLUS provide a multipurpose "shoe" for the horse.

This growing "horn-shoe" is not only the obvious physical barrier to protect the inside from the outside, but it is also a structure, designed by evolution to provide **flexible resilience** - the ability to adapt to- and absorb impact and therefore providing an effective protection that works as shock-absorber **and** act as appropriate traction device.

The flexible resilience will prevent it from breaking and chipping but will also allow it to wear as required to balance the growth.

Pretty clever!

You don't have to be an equine podiatrist, to know that it would be almost impossible to work on a dehydrated hoof with a razor sharp hoof knife (you might as well try to shave a block of granite), hence a number of desperate hoof trimmers came up with the idea to resort to power tools, such as angle grinders and dremels! Personally, I prefer these to stay in my husband's toolbox!

Why would I **not** want the hoof to be hard rigid and dry? Isn't that what conventional hoofcare recommends?

Isn't water making your horse's hooves soft, shrivel and dissolve? (remember Auntie Tilly, the manicurist in the Palmolive ads, soaking fingernails?).

Does "hard" equal "strong"?

NO! Quite the opposite:

Imagine your bike had all wooden wheels.... how comfortable and safe would it be, riding it over various surfaces?

Because your bike has elastic (air-tubed) wheels, you ride in reasonable comfort and with "grip" or traction. If you ride over a stone, the wheel will not break, as most certainly the rigid wooden one would if impact happens at the "right" angle or force, but it will flex around the stone somewhat. Driving over a bump will not cause jarring and concussion, but your air-filled tire will allow for shock absorption, because it is elastic.

This is not the best example, but it shows that "hard" and rigid is not at all stronger than elastic, especially in relation to biomechanics, where different surface structures impact on one another. Just ask an architect.

Why do our domestic horses have notoriously dehydrated hooves?

(especially in dry and hot weather)

Because they drink out of bath tubs and troughs and rarely get any moisture on their hooves!

(There are the lucky ones that have a dam in the paddock)

The situation is even worse when their hooves are constantly exposed to dry dirt and dust or stable bedding that absorbs and draws moisture.

So how do all the wild horses that live in extremely harsh, often dry climates get water on their feet?



No, not quite like this...

...but like this:



Of course the hotter and dryer the climate is, the more often the animals do HAVE to drink. Or they die. Of dehydration.

Water is life.

Horses walk into the body of water they drink from (or the muddy edge of it).

The mud that packs into the concavity of the hoof will preserve the moisture even longer!

The hoof itself has insulation properties to prevent excessive moisture loss (or absorption) and yes, there is a certain level of internal moisture provided from the living tissue and its blood supply.

But the resilience of the hoof capsule in its entirety is only possible by a reasonably stable moisture content throughout all layers, from deeper levels to progressively more external layers, whereby the moisture fluctuation of the external layers is influenced by environmental conditions.

The gradient in tubule density mirrors the gradient in water content across the hoof wall (Pollitt 1995) and together these factors represent an optimum design for equine hoof wall.

Interestingly, the density of the tubular growth is determined by the breed (hard or soft terrain breed) and to a degree by the terrain stimulation that the horse is exposed to most of the time. (The harder the ground, the denser the tubular growth will be and the less water absorption potential and moisture requirement it will have).

This suggests that the denser, and therefore harder hoof horn of the hard terrain breeds has less water content in the various horns of the hoof -but

U
N
O

A
L
L
A

V
O
L
T
A
—
O
N
E

A
T

A

T
I
M
E



still has enough elasticity (from moisture) to keep it healthy and functional. Comparing our findings to hooves of their soft terrain breed cousins, we find that their hooves also require more impact from the hard ground for hoof mechanism. The horn needs to be more wear resistant as well. When looking at the origins of these hard hoofed breeds, we will find that they have come from areas of the world with very harsh and also dry terrain conditions.

The water content of the various horn types in their hooves reflects the need for tough, wear resistant, yet resilient hooves that are still able to flex sufficiently to provide for hoof mechanism.

Looking at a hoof of a soft terrain breed that would naturally live on soft ground (which gives little impact and stimulation on the coronary bulge where the density of the tubular growth is determined), we see that the soft terrain breed not only has naturally a softer hoof capsule (with higher water content) to enable it to function on soft ground, but that it actually NEEDS a softer, more elastic hoof capsule with high water content in order to enable hoof mechanism!

Of course, a soft hoof capsule would be wearing excessively, if exposed to "hard terrain breed environment".....

In other words, the breed with its inherent terrain requirements also determines (amongst other things) how much moisture content the various horn types must have, so the hoof can function for maximum performance and health.

Moisture loss is caused by environmental conditions, but especially the condition of the ground that the solar surface of the hoof is exposed to.

This lost moisture must be replaced regularly, regardless of the breed, so the hoof never dries out into the deeper horn layers, which happens to all horses that have no walk-in access to water – unfortunately most of our domestic horses!

A dry inflexible hoof works like a contracting cast and will render the hoof unsound –dysfunctional.

(Not mentioning that it becomes impossible to trim and care for!)

Wild horses rehydrate their hooves EVERY TIME they drink.

In hot and dry conditions they drink more- therefore the hooves are also exposed to water more!

It is a natural balance of demand and supply to keep an equilibrium and homeostasis which was until now, rarely ever considered, looking at conventional hoofcare, where applying oils and grease to hooves seem to be seen as good practice.

The theory is to "preserve" moisture within the horn, but since most of the moisture is lost from the solar aspect (where the open end of the tubular horn happens to be), this theory is not working, no matter what the manufacturers of hoof applications claim.

Neither oil, grease nor tar products can replace lost water. It does not have the same properties and therefore cannot cause the same effect: Rehydration.

Some of the most popular hoof applications even contain wood tars! This may make hooves look nice and shiny, but dry out the areas of application

U
N
O
A
L
L
A
V
O
L
T
A
—
O
N
E
A
T
A
T
I
M
E



even more and prevent moisture absorption!

If your farrier comments on the hard hooves your horse has and he can't remove sole that should be exfoliated – (or the wall splits when the nail is driven in!), then think again, if this is the hardness you would want!

I have made a little experiment to demonstrate that hoof horn can regain its original hydration state after complete dehydration:

I have placed a shriveled, dry hoof wall clipping into a glass of water for 48 hours:

Here is the result:

The keratin structure will not dissolve, so "oversaturation" is not possible.

Placing the clipping in oil or grease will not cause the clipping to go back to its original state. It will stay

shriveled up. But it may look nice and shiny.....if that makes you feel better....("looks good, no function")

Try it yourself.

Hoof horn can not "oversaturate".

So why do many horses get "awful" hooves in winter, when moisture is plentiful, and they pretty much have wet feet all the time?

Well, there are three main reasons:

1. The integrity of the hoof capsule is broken (e.g. there are cracks, splits, nail holes, stretched white line or existing white line disease – any mechanical or chemical breach of the hoof capsule's integrity)
2. The hoof does not have enough stimulus to promote healthy tubular orientation (the underground is too soft, e.g. deep mud, no ground antagonism)
3. The hoof does not receive adequate stimulus for hoof mechanism and healthy circulation, hence horn production may be slower than opportunistic microbic growth.

(Fungi and bacteria thrive in a damp environment, but can only do harm if tissue replacement (= horn growth) is slower than the decomposition of same by micro organisms).

This should make it fairly obvious that it is not water that damages the hoof, as so many are led to believe, but the lack of appropriate ground stimulation.

Horses in the Camargue live in the flooded Rhone delta for several months, with their hooves emerged in water all the time.



U
N
O

A
L
L
A

V
O
L
T
A
—

O
N
E

A
T

A

T
I
M
E



Under water are river rocks, which stimulate the tubular direction and density, creating a hard terrain hoof. The water absorption ability is maximized – but the hooves are very hard, despite being emerged in water most of the time when large areas of their habitat are flooded- which usually is the case several months of the year! These horses walk on river rock!



U
N
O

A
L
L
A

V
O
L
T
A
—

O
N
E

A
T
A

T
I
M
E

But coming back to the common domestic problem of dry hooves!

The more balanced the moisture content of hoof horn remains (by frequent rehydration, preventing deep layer dehydration), the stronger the hoof will be, the better it can function – and the more comfortable it is for its owner! (And the trimmer who is trying to care for your horse’s hooves)

What if ...

...we can not provide our horses with “a body of water they can walk into to drink”?

(And let’s face it, most of us can’t....):

Here are a few ideas, but lateral thinking is always encouraged!

Make the re-hydration of your horses’ hooves part of your grooming routine. You won’t regret it as you will be contributing to the health of your horse. No hoof no horse, you know?!



Standing your horse on wet carpet helps as well!

Continued on next page...



Or make your own soaking boots from tire inner tubes, water-proof canvas – or whatever you can think of!

Below pictures by Julia deJesus Palma and her emergency booting:



I put a sponge on the sole, the black ring is a rubber from plumbing, and it ties the towel with a leather string tight, but elastic around the pastern

More soaking ideas:



How long to soak?

How long to soak?

It really depends...If you are soaking to soften the hooves before trimming, you may have to soak for much longer than 10-15 minutes - in a dry climate, it may even take overnight soaking in hoof boots to soften the hooves enough! You will just have to experiment. If you are soaking the hooves to help eliminate contraction, follow the advice of your hoofcare professional. There may even be periods of overnight or continuous soaking, initially, to achieve a certain effect. If you are soaking just to re-hydrate the hoof and white line, and to maintain a healthy foot, you can soak for just 10-15 minutes per day in wet climates (like Germany or the Pacific Northwest). Keep in mind that every climate zone is going to create different challenges for your soaking regimen. Also, different seasons (and rainfall quantities) will make your soaking needs change. Horses kept on grass have moister feet, in general, than those kept on dirt. But no matter what your area is like, you need to make sure those hooves have enough moisture to keep them from contracting, and to keep the white line tight and healthy. And if you are starting out with contracted hooves (like most!) then water is one of the most important tools you have to change your horse's hooves back to healthy ones.

U
N
O

A
L
L
A

V
O
L
T
A

—

O
N
E

A
T

A

T
I
M
E