Treatment of Disease in the Equine Frog

Part 3 of Health and Disease of the Equine Frog

by Candace Platz DVM and Heike Bean

Trimming

Trimming and debridement of affected tissue is the cornerstone of treating frog disease. This process must be continued long enough to remove all diseased tissue (which may be days or weeks) and frequently enough to remove compromised horn as it grows out, before the disease process has a chance to extend deeper into the frog.

Initial treatment involves the removal of as much diseased tissue as possible, without invading the live frog plane. The image in Fig. 36 may be helpful to understand the anatomy of this area. As a general guideline, removal of compromised horn should not cause pain, lameness or bleeding. If in doubt, err on the side of being conservative. The frog grows quickly, and it is better to remove tissue gradually over several days, than to risk further damage to the frog by over-zealous trimming.


Fig. 36

Photo courtesy Jenny Edwards
www.all-natural-horse-care.com

If at all possible, the horse should be trained to allow a person seated on a rolling mechanic's stool to work with the upturned hoof placed in a towel–draped lap (Fig. 37). We have easily and successfully taught this method, which greatly facilitates effective treatment, to horses as old as seventeen years and as young as five months. It goes without saying that a horse must be completely reliable and comfortable when handled this way. Additionally, we do not recommend cross-tying horses when working on feet. A second handler at the head is helpful for horses learning to accept this method and adds a degree of safety for the trimmer in horses that are already trained.


Fig. 37

All photos courtesy Candace Platz DVM and Heike Bean

Good lighting is essential for thorough examination and trimming. Occasionally, one stumbles upon problems by accident, but in general, only methodical probing and painstaking cleaning of all the sulci, as well as thorough investigation of any soft and/or discolored areas can ensure that all diseased portions are identified and treated.

Proper tools are a necessity. These include sharp left and right handed hoof knives, preferably with a small curl. Diseased tissue can be difficult to cut, as it tends to bend away from the knife, so sharp tools are needed for accurate and efficient removal. Loop knives may be helpful, but should be as narrow as possible. Care must be taken when using them not to inadvertently remove too much material from the bar walls or the collateral grooves. Double sided abscess knives work well for fine trimming. Dental probes, scaling tools, awls, small Phillips head screwdrivers, and the tiniest bone curettes are effective for accurately scraping away dirt or diseased tissue, especially in horn cavities and deep in the collateral grooves. Dental offices often discard tools no longer suitable for their use that are still very helpful for working on horse's feet.

We have heard that it is wrong to aggressively clean the depths of the collateral grooves. In our experience, only diseased grooves are sensitive, and in this case, indeed, care must be taken to avoid invading live tissue by accident. Healthy grooves cannot be hurt, even with rigorous cleaning using sharply pointed objects. We routinely use awls, regular screwdrivers with the corners rounded, and small Phillip's head screwdriver (which lightly scour the sides of the collateral grooves) without any problem at all. It is essential that dirt and compromised tissue be removed as much as possible, to allow penetration of therapeutic agents as well as prevent the progression of disease (see examples of tools in Online Extras Page 26).

Close scrutiny must be given to the connection between the frog and the heel at the caudal exit of the collateral groove. To facilitate cleaning (particularly casual cleaning with a hoof pick in stabled horses or horses otherwise living in damp conditions) the groove may be trimmed so that the hoof pick does not hang up at the back of the groove, but can be smoothly swiped from front to back. However, for horses that wear their heels excessively, it may be preferable to leave as much healthy frog as possible in that area.

Before frog treatment, the horse shown in Fig. 40 always wore his lateral heels too much, overcompressing the associated heel bulbs, as well. Now that the frog is healthy and strong, he no longer has these problems. But it is important for him to keep as much frog material as possible in the lateral collateral groove exits, as shown in the photograph. When leaving this much frog horn, be certain no disease is hiding under the flap where


Fig. 40

the frog overlies the heel horn. Occult disease hiding under these flaps will weaken the area and organisms can easily migrate to the inner hoof wall from this junction. In many cases, including this one, eliminating inner hoof wall disease was not possible until the frog disease was controlled.

We have seen cases of chronic insidious hoof "abscesses" caused by extension of white line infection from the caudal frog/horn junctions. Such seeding of infection from infected frogs to other parts of the foot is a frequent and problematic complication of frog disease, and can obscure the primary problem.

Fig. 41 shows an example of what can happen when the frog/heel junction is not healthy. The disease process can progress all the way to the coronary band. This picture is quite dramatic, but the same process can be much more subtle, and often goes unrecognized as an underlying cause of lameness, chronic infection or poor hoof/frog conformation.


Fig. 41

Examination of the Frog

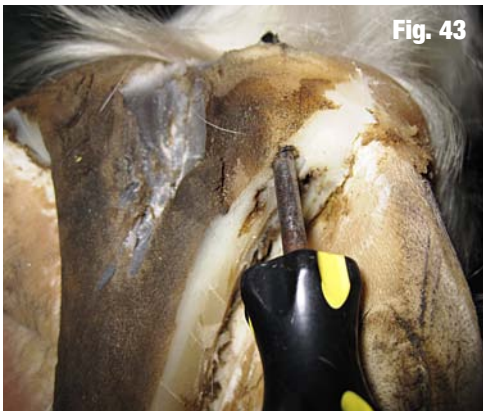
The entire frog should be scrutinized carefully, and any tiny defects gently explored with appropriate instruments as discussed above. Hoof picks and ordinary hoof knives are too large and coarse to do an adequate job of detecting small pockets or slits. The frog should be pulled upward along its length to make sure there is a good connection between the frog horn and the live frog plane. The very bottom of the collateral grooves should be completely visible and cleaned to reveal any discoloration, odor or soft spots. The frog's surface must be firmly prodded to determine if any soft spots are present and to ensure that the horn is of equal consistency and strength from tip to heel. It is common for unhealthy frogs to feel quite firm at the tip but become increasingly soft and less dense toward the back and near the central sulcus.

Ideally, all hiding places for microbes should be eliminated whenever possible, including overhangs, slits, pockets, and fissures. If this is not possible without exposing sensitive tissues, these areas should be aggressively treated medically until the diseased portion grows out enough to be trimmed away without harm.

Fig. 42 shows what seems to be a minor defect in the frog. In the next image (Fig. 43) we see how appearances can be deceiving!!

All photos courtesy Candace Platz DVM and Heike Bean

Fig. 43 shows the extent of the defect, demonstrated by the penetration of the screwdriver through the heel of the frog.



To remove all of the frog above this defect would cause the horse to be sore, especially on frozen (or hard/rocky) ground. But one must make sure that the treatment reaches into the defect while the frog is growing out, so that the disease does not progress deeper into the foot (see more frog inspection examples on Online Extras Page 27).

These examples illustrate the importance of a thorough examination of the frog and caudal hoof, in order to detect, treat and prevent occult infection as early as possible, to avoid subsequent horn loss and invasion of sensitive tissues.

To further confuse the issue, traditional hoof care literature often presents photographic examples of supposedly healthy, disease-free frogs which, to the educated eye, are grossly unhealthy. The slit-like extension of the central sulcus into the heel bulbs is not necessarily "normal" nor are collateral grooves naturally "smelly" and punky. In typical American fashion, we are told that "bigger is better," but, in the case of the frog, this is not always true. Sometimes tissue hypertrophies or overgrows when it is compromised and inadequate to meet the demands placed on it. Big frogs are not always healthy frogs. Sometimes they are undermined and riddled with pockets of disease.

Additionally, there is little support in the realm of traditional hoof care for the kind of meticulous work of frog therapy that we describe in this article. To the contrary, the hoof care practitioner is often admonished to leave the frog alone to its own "wisdom." Understandably, the novice frog trimmer can feel anxious and intimidated as s/he begins to explore tiny holes and tracts in the horse's frogs. In our experience we have never caused lameness or created soreness in a horse using the methods we describe, even on the rare occasion where necrotic tissue bled when explored. Even more importantly, those we have taught to do this work have never made a horse sore or lame.

When diseased tissue is exposed to air and treated, it will always improve. However, sometimes things will seem to get worse before they get better. We have had many cases where, as superficial tissues healed, the necrotic tissue sloughed off and underneath there was still MORE diseased tissue, not yet necrotic. Incredibly, in most cases the horses were not overtly lame. We have learned that soundness must be thought of in relative terms. There is "sound" in the sense of not limping or moving evenly, but a horse with bilateral pain will appear sound according to these criteria. However, the unguarded, confident and loose placement of the healthy caudal foot to the ground looks very different than the stiffer and more deliberate placement that a horse with occult frog disease exhibits.

Learning the skills needed to detect and treat occult frog disease is not particularly difficult, and the rewards in terms of true soundness, improved gait, overall hoof health and function, and prevention of disease are well worth the time and effort required.

Treating the Disease

No single therapy works in every situation, nor is there one protocol for a given therapy that is always appropriate. Rarely does one bout of treatment permanently eliminate and prevent the recurrence of disease, particularly in stabled horses, those living in moist environments, and of course those with severe infection or conformational abnormalities. Most often, frog infections are so pervasive and long-standing that it can take months for the diseased tissue to completely grow out, discouraging the hoof care provider into thinking that the treatment does not work. Remember that frog disease is really a syndrome and not a discrete disease entity. There are multiple causes (environment, conformation, trimming, shoeing, past disease, exercise level, diet, etc.) and agents (gram positive or negative bacteria, fungi, aerobic or anaerobic organisms and various combinations of these). Infections within a single foot may conceivably be of different origins and harbor different organisms. Efficacy of any given therapy will depend on these variables as well as the different immune capabilities of each individual horse.

Daily thorough hoof cleaning must be done in good light (NOT in a dark stall) so that the depths of the collateral grooves and the central sulcus can be clearly seen. Routine treatment with hoof disinfectants may, in most cases, be an inevitable and permanent component of hoof care for those who want optimal foot health for their horses. In Europe, this is quite often the standard, but for some reason, in the US (perhaps because of the dry conditions in the West becoming the model for the rest of the country), a casual swipe of the hoof pick to remove big chunks of manure is considered adequate maintenance. The prevalence of hoof problems that have their roots in frog disease suggests otherwise. Periodic soaks with chlorine dioxide agents such as White Lightning or Oxine are also often necessary to maintain healthy frogs. The frequency of disinfection and soaks depend on individual management circumstances and the susceptibility of the foot to infection due to prior disease, conformation and choice of therapeutic agent.

Treatment can be divided into three categories: spot therapy of isolated defects, topical agents and soaking. In the last two categories, the whole foot may be treated, or only the sole and frog.

Of the countless products on the market, some agents may be used either way, while others are only designed for one or the other. One should always look for the least toxic, or better yet, non-toxic ingredients.

Below is a list of some products that have been successful in treating frog disease, either in our own experience, or that of other horse owners.

Topical Products:

- **Usnea**
- **Oregano oil**
- Pete Ramey's "**Pete's Goo**" (50-50 mixture of Neosporin or generic triple antibiotic ointment + human Athletes Foot Cream (1% Clotrimazole)
- **Goo modified** by some to desitin, monistat, athletes foot cream and neosporin
- **Life Data hoof disinfectant**
- **Huuf Magic**
- **Thrush Stop**
- **White Lightning Gel**
- **Silvetrasol**
- **Germcontrol 24** (seems to be the same as Silvetrasol, just a lot cheaper)
- **NoThrush**
- **Mastitis antibiotics**
- **Sav-A-Hoof**
- 50-30-20 mix of **apple cider vinegar-Listerine-Oxine**

…and the list goes on.

Common Soaking Agents are:

- **Apple cider vinegar**, diluted with water, up to half and half
- **Oxine AH**
- **Clean Trax**
- **White Lightning**
- **Germcontrol 24**

According to a PhD chemist, Oxine AH and White Lightning seem to be identical products. However,

(cont. on page 14)

(cont. from page 13)

clinically, some horses have reacted with swollen legs to White Lightning (WL), while doing fine with Oxine, which seems to be milder. In the same vein, White Lightning seems to have been more effective in clearing certain stubborn infections that Oxine was not able to resolve. Oxine is about 4 times less expensive per volume, and must be highly diluted, 2 to 4 oz. per gallon of water according to the distributor, which makes it much more cost effective in the end. WL states that their product's main therapeutic effect comes from the release of gas, which must be trapped around the hoof. The gas is released when the product is diluted, usually by diluting 50:50 with white vinegar. Some sources say this solution can be extended by the addition of water to cut costs. Oxine is not said to produce gas. Excessive iron in the water used for dilution will reduce its effectiveness. If uncertain about the iron content of your tap water, the use of distilled water is recommended.

Having used both products (Oxine diluted and undiluted, activated with citric acid or vinegar, and White Lightning mixed half and half with white vinegar and diluted with water), most of the time we saw no difference, but in certain situations, White Lightning may be worth the extra cost.

Recently, we have begun experimenting with Germcontrol 24. The preliminary results are encouraging. Clean Trax is quite effective, but very expensive and impractical, due to the long soaking time required, and the fact that the hoof needs to be totally submerged.

Cider vinegar seems to be somewhat helpful, but not nearly as effective as the above-mentioned products. When soaking with vinegar for abscesses, we noticed some temporary improvement in frog health, but the effect is relatively superficial and short-lived.

Commercial boots for soaking are available, but recycled large IV fluid bags work very well if you can find them. Large animal hospitals go through quite a lot of them. When no soaking is done, topical agents should be applied daily, particularly if infection is severe. Tracks, fissures, pockets and caverns not able to be eliminated immediately by trimming can be spot treated to keep the infection under control until the area is sufficiently grown out to enable trimming. Cotton soaked in topical disinfectant can be stuffed into infected spaces.

As discussed above, NO single treatment protocol works all the time on all horses. The progress of each individual case depends on numerous factors, including time of year, overall health, diet, environment, exercise level, and hoof type, as well as the level of care that a caregiver can manage. "Natural" living conditions are no guarantee of healthy frogs. Foals as young as five months living at pasture have been found to have severe frog disease. Even these babies have been successfully trained to accept the necessary treatment and recover fully.

Treatment Methods

The best way to prepare a hoof for treatment is by washing it with a good brush and maybe some dish soap, paying special attention to deep crevices to facilitate viewing and debridement. If washing is not an option, remove as much dirt and debris as possible, using tools and a stiff brush, followed by pressing a clean cloth into any clefts, sulci, crevices, etc. until it comes out clean. Trimming and medication of the frog will then be easier and more effective.

All photos courtesy Candace Platz DVM and Heike Bean


Fig. 52

In Fig. 52, Thrush Stop is applied with a small paint brush to distribute evenly across the frog and white line. Note how well the frog has been cleaned and trimmed before the application, although diseased tissue is still evident.

Fig. 53 shows the materials required to start an Oxine Soak. Materials include citric acid or white vinegar, cotton balls, a measuring cup, latex gloves and baby powder. Oxine can be activated either with vinegar or citric acid. Follow the label on the bottle. (White vinegar is not mentioned on the Oxine bottle label, but can be used in equal parts to the Oxine.) The activation time is about 3 to 5 minutes, and turns the liquid yellowish.


Fig. 53

Cotton balls are for stuffing the collateral grooves so that very little liquid is used and only the sole is covered. We found that submerging the entire hoof dries it out too much. We also recommend using gloves, as the mixture is drying to human skin as well. Baby powder enables multiple uses of the gloves. Just a little dusting after removing them helps to get them on and off easily next time. For average sized hooves, about 1 cup of liquid is enough. We use as many cotton balls as needed to absorb all the liquid.

Fig. 54 demonstrates how 3000 ml IV bags make excellent reusable soaking boots for most horses. Using duct tape, we make boots out of them, which allows for easy on and off. Mark the boots for each horse and hoof with permanent marker. For the smaller hooves, simply cut off the valve end and shape the boot around the foot, with the hoof in your lap. Bigger hooves require more creativity. The long side must be slit. It is a bit trickier to shape the boot, but still works. The boots must not be so snug that they cannot be easily removed. If stored in cold conditions, the boots may need to be warmed with a hair dryer or other warming device prior to use.

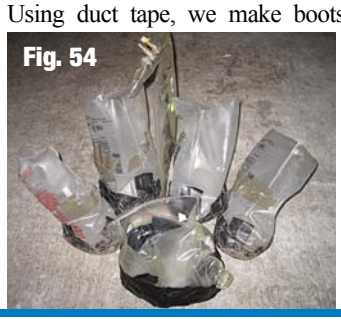


Fig. 54

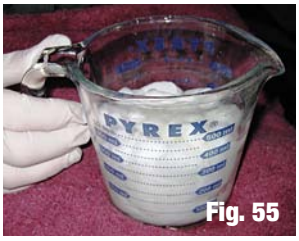


Fig. 55


Fig. 56


Fig. 57

Fig. 55 shows the cotton balls soaked in the activated Oxine.

Fig. 56 shows the application of the cotton balls.

Fig. 57 shows the boot on the foot. Most horses readily accept the IV bags as soaking boots without a fuss.

Fig. 58 shows all 4 feet in boots, and tied with bailing twine. Duct tape may also be used. On smooth surfaces, the horse can walk around safely in those boots. You even can turn him out in them, but they do wear on abrasive footing. Extra layers of duct tape on the sole helps to prevent that.


Fig. 58

Preventative Maintenance

The adage "An ounce of prevention is worth a pound of cure" most certainly applies to frog care.

Disease usually settles in the sulci, so keeping the central sulcus well-trimmed and collateral grooves open, clean and free of dead horn is essential to prevent new infection. Many equine professionals advise against trimming frog, especially on a routine basis. We respectfully disagree, based on our experience in the northeastern United States. Perhaps in other regions or with particular breeds

of horses, our methods are not appropriate. But in our area, with mud, snow and damp conditions conducive to the growth of microorganisms, passive wearing of the ground surface is inadequate to remove devitalized and infected tissues, and disease readily establishes itself in grooves and crevices of the frog. Even in the drier summer months here in the Northeast, trimming is still necessary.

Any part of the frog can become diseased. Careful paring down to strong waxy frog and probing the entire frog for soft spots is important.


Fig. 59

All photos courtesy Candace Platz DVM and Heike Bean

Fig. 59 shows the clean, waxy-looking live frog horn on the sides and the dead, fuzzy looking layer covering the rest of the frog. Note also the fuzzy looking depths of the collateral grooves. These grooves should be judiciously cleaned so that the "fuzz" is removed, exposing any discoloration or infection.

Depending on ground conditions and an individual horse's propensity for frog disease, we examine healthy frogs at least once a week, trim what is necessary and apply some topical treatment. Ideally, inspection should be done at least every few days, with appropriate therapy. In horses with limited turnout space or those who stand in manure, daily inspection and disinfection may be advisable. The choice of agent can be based on price, convenience, effectiveness and personal preference. Many of those mentioned previously work quite well.

Recently, we have been using No Thrush and are pleased with the results. No Thrush is a dry powder, consisting of kaolin, phosphate compounds, salts of copper and iron, oregano powder, A 1 silicate, diatomaceous earth and 0.25% chlorine. It is also a good spot treatment for defects. We found that spreading it with a small paint brush over the frog and into collateral grooves works very well.

The details of how often and which agents to use for restoring and maintaining healthy frogs are less important than the following principles:

1) Periodic and routine inspection in good light, after a thorough cleaning of the foot.
2) Palpation, probing, scraping and if necessary, paring the frog with appropriate instruments in good light, down to healthy horn in all areas. Any surfaces not available to inspection are available to infection.
3) Assessment of the condition of the frog and identification of areas of infection early on.
4) Regular disinfection, ranging from frequent soaks with chlorine dioxide to periodic application of liquid, gel or cream antimicrobial agents or dusting with No Thrush, according to individual circumstances.
5) Maintaining overall health of the horse through appropriate management, including diet, environment and exercise.

Although this may seem daunting, in our next installment, we will review more case histories that show how even newcomers can tackle chronic debilitating frog disease with great success. Also featured will be an expanded account of the wonderful work of Josephine Trott, PhD, Assistant Project Scientist, Department of Animal Science at the University of California, Davis.

For several years Josephine had been contending with chronic central sulcus thrush, and some 8 months ago, began battling it in earnest by picking the hooves at least daily and applying a variety of frog treatments including: Tomorrow, Neosporin or Neosporin plus Athlete's foot cream, a solution of 0.5% gentian violet and 0.5% iodine, diluted Lysol cleaner or 50% apple cider vinegar in a spray bottle to clean and disinfect. In addition, she used occasional treatments with Durasole and 40% zinc oxide cream and occasional soaks in activated Oxine AH or Clean Trax. Four of the frogs had such deep central sulci that when cleaned too vigorously, the bottoms would bleed.

Most of the above listed agents would likely have yielded good results had the frogs been properly cleaned and debrided, and treatments administered more frequently. After consulting the authors, Josephine decided to apply Oxine alone, along with the agent "No Thrush."


Fig. 60a

Day 0 - Left Front.


Fig. 60b

Day 42 - Left Front, after 21 days Oxine alternating with No Thrush, then 21 days of No Thrush only.

The following images (Fig. 60-61) of two different hooves illustrate her results (see more photos in Online Extras Page 28).

Fig. 60a, b: This hoof was treated for 42 days: The first 21 days with Oxine and No Thrush alternately; the next 21 days with No Thrush alone.

Fig 61a, b: This hoof was treated for 47 days with No Thrush alone.


Fig. 61a

Day 0 - Left Hind.


Fig. 61b

Day 47 - after 47 days of treatment with No Thrush only.

Healing diseased frogs can be very challenging and often frustrating. The lifestyle of many domestic horses promotes chronic re-exposure to pathogens. The equine body was not designed for this level of infectious challenge, and is further compromised by improper nutrition and inadequate exercise needed for optimal immune function.

Restoring frog health usually requires perseverance and patience, but in many cases the physical and financial trauma of traditional diagnosis and (often ineffective) treatment of "caudal heel pain" can be avoided. Often in such cases, frog disease is the inciting cause. As the frog heals, so does the rest of the foot, avoiding the need for corrective shoeing, nerve blocks, pain medication and other modalities used to mitigate the effects of caudal heal pain. At the very least, there is great satisfaction in facilitating the healthy function of the equine hoof, helping the horse to move in total confidence and freedom. In our experience, this reward is well worth the hard work of training, treatment and maintenance.

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See **Online Extras Pages 26-28** for a continuation of this article, with expanded photo examples. In **THH Issue 41**, we will continue this Frog series with case study examples of successful thrush treatments following the authors' recommended protocol.