A Reader's Viewpoint...

The Evolution Of Hoof Protection Products

The basic scientific principles are as valid today as they were many years ago

By M.J. Pautienis and Richard Shakalis

FOR CENTURIES, man has seen the wisdom of coating horses' hooves with various substances for protection and to maintain flexibility. Pine tar, paraffin, oils and salves have been passed from one generation to the next with varying degrees of success.

The basic principles, maintaining the internal moisture of the hoof wall while repelling harmful substances, is as valid today as in the past. To understand why modern hoof conditioners work so well, let's review some basic biology and the actual function of the hoof.

The hoof wall is the essential weight-bearing structure of the hoof and is composed of thousands of tiny hollow fibers called tubules. Running vertically from the coronary band, these tubules are cemented together with a protein substance called keratin (Figure 1). Layer upon layer of these tubules act effectively as springs to absorb tremendous amounts of concussive force while retaining the necessary tensile strength.

Moisture Is Critical

The elasticity of these tubules and the hoof wall in general is dependent on its internal moisture content. This moisture is not simply water, but a mix of salts and electrolytes, much like those found in intravenous solutions. Without this essential moisture, the hoof wall can dry up, crack, become brittle and generally fail at its job of operating much like a leaf spring and shock absorber. Too much moisture, on the other hand, can make a hoof too soft, mushy and likely fail to absorb its concussive load.

"Because the hoof is protein, it is potentially biodegradable..."

However, we now understand that the ideal hoof conditioner maintains the natural moisture balance found within the hoof wall.

Where does this important moisture come from? The hoof is designed to receive at least 90 percent of its moisture from the blood and lymph vessels along with a small percentage from the sole. Modern bonded sealants are effective because they stop the evaporation of essential moisture from the hoof wall.

Attempting to moisturize the hoof wall with grease or salve is mostly futile because the hoof wall is virtually non-absorbent. This is why using hoof conditioners and dressings that contain vitamins or proteins are considered a waste of time. To be beneficial, proteins and vitamins have to pass through the digestive system and be broken down into useful building blocks by digestive enzymes.

Applying vitamins and protein to the hoof wall makes little sense. The coronary band is the only place where products meant to condition or increase hoof growth should be applied, and care should be taken here as well. Along with the sole, this is where transpiration or "breathing" occurs (Figure 2).

You may ask why wild horses don't have these hoof problems. Or why does an owner need hoof protection if his or her horse doesn't have any hoof problems?

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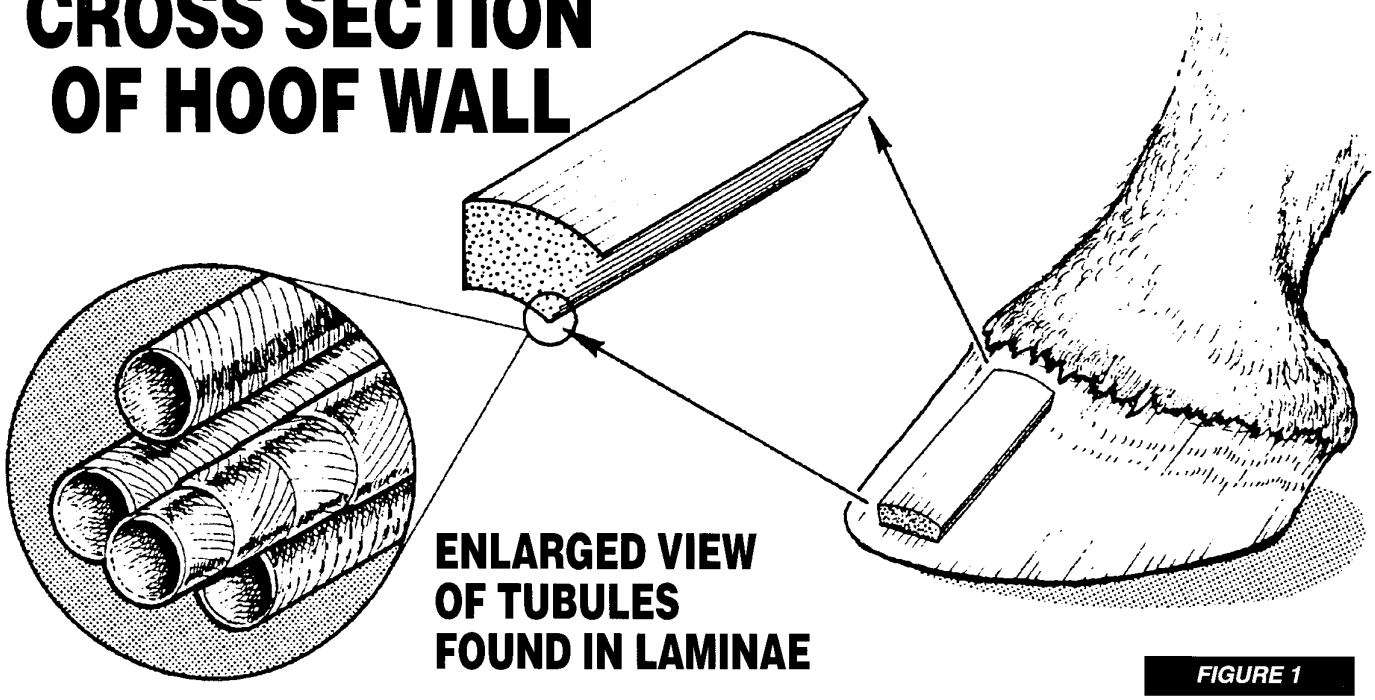
CROSS SECTION OF HOOF WALL



ENLARGED VIEW OF TUBULES FOUND IN LAMINAE

FIGURE 1

TRANSPIRATION (BREATHING)

OCCURS AT THE CORONARY BAND AND SOLE

PERIOPLE (NATURE'S SEALANT)

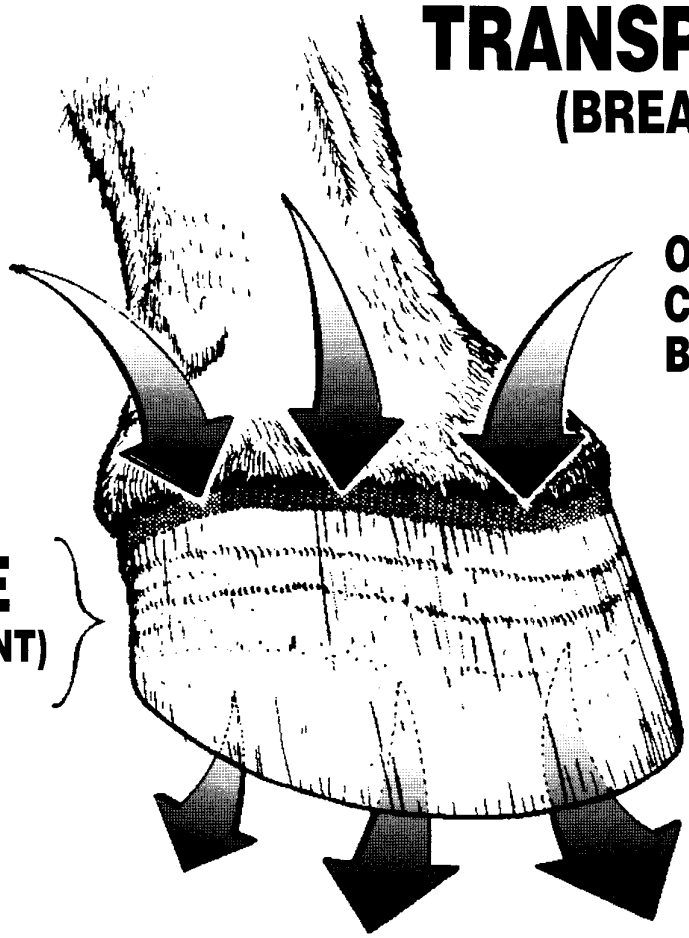


FIGURE 2

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***REPLACING PERIOPLE.** Modern hoof dressings attempt to seal nail holes and replace the periople lost during rasping.*

***POTENTIALLY BIODEGRADABLE.** Since the hoof is made up of protein and is potentially biodegradable, hoof conditioners must replace the periople in order to be effective.*

The answers to these questions lie in the domestication of the horse.

The periople is the protective covering that evolved to contain natural body fluids within the hoof wall while repelling harmful contaminants.

Natural Sealants

The hoof actually has its own natural and delicate hoof sealant. While this natural sealant serves wild horses well, it is usually lost in a domestic environment. It is inadvertently removed during the shoeing process when the hoof is trimmed, balanced, leveled and shod. To compound the problem, the domestic horse can no longer roam free over miles of open space but is confined to smaller pastures, paddocks and stalls.

With little or no remaining natural sealant and with the horn tubules opened from nail holes and rasping, hooves are exposed to higher concentrations of destructive uric acid and other contaminants. With the protective outer hoof covering removed, the introduction of these agents into the hoof wall can lead to breakdown of the keratin protein.

Tiny openings found on the hoof wall caused by cracks and nail holes are the main pathways for infection from bacteria, fungus or other contaminants.

It is important to remember that because the hoof is protein, it is potentially biodegradable. Domesticated horses need a hoof conditioner that effectively replaces the periople.

Your grandfather and his grandfather often intuitively used a pine-tar hoof conditioner. This acted as a precursor to the modern sealants as it helped retain moisture in the hoof wall. While pine tar had its drawbacks, Grandpa was on the right track.

Various products that came later contained oils, paraffin derivatives (wax) and petroleum-based ingredients that were used with limited success to coat the hoof and fill in the nail holes.

Hoof conditioners containing tar, paraffin, petroleum derivatives or especially protein and vitamins are not inert. They tend to break down with time when exposed to the environment. Since these dressings are usually sticky, they attract contaminants instead of repelling them.

Their application actually may be counter-productive since they can serve as

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HOOF CARE CONCERNS. Caused by nailing and clenching, nail holes are potential pathways for many types of bacteria and fungus to enter the hoof wall.

a bacterial and/or fungal-growth medium when they fester in a small crack or nail hole. These organisms produce enzymes and exotoxins that can break down collagen and protein in the hoof wall.

If hoof wall disease does not develop, the least that can happen is that the hoof will become soft around the nail holes. If this happens, a client's horse will likely throw more than its fair share of shoes. The ideal hoof conditioner should be stable when cured, able to seal out harmful contaminants and be resistant to abrasion.

Other added ingredients found in some hoof conditioners, such as formaldehyde and acetone, are powerful drying agents and can be downright harmful to horses, humans and the environment. Their use has been associated with cancer and liver damage.

Use them with caution or not at all. These sealants or dressings don't resist abrasion and can be easily wiped off. As a result, they need to be reapplied frequently, even daily, to get the maximum benefit.

Dr. M.J. Pautienis and Dr. Richard Shakalis are researchers for SBS Equine Products in Hyannis, Mass.

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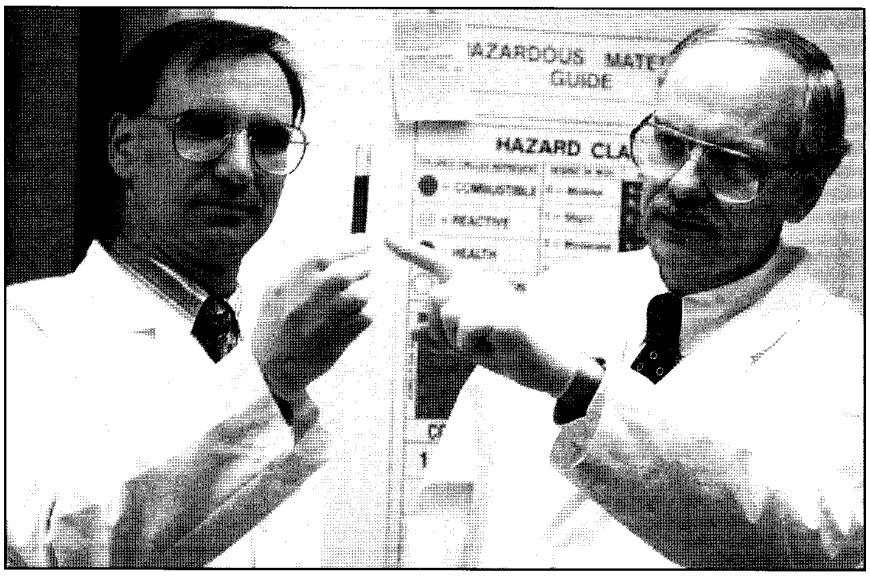
New Generation Products

Some of the new generation of hoof conditioners are spin-offs from the field of dentistry. For years, dentists have coated children's teeth with bonded sealants to protect against tooth decay. When someone had the idea to try this same technique on horses' hooves, a new generation of bonded hoof coatings was born. These bonded coatings outperformed the old oils and pine tars and are extremely effective at sealing in essential moisture and sealing out harmful substances.

These are two classes of bonded hoof coatings:

1. The first is based on methyl cellulose, the main ingredient found in fingernail polish. The drawback with these coatings is a thin, watery nature that tends to make it wear rapidly and not fill in cracks and nail holes effectively.
2. The other class is urethane based. Urethane is an extremely tough, inert, flexible polymer. Recent breakthroughs include urethane coatings that contain microfibers. These coatings fill in small cracks or nail holes and tend to wear and last longer between applications.

Modern technology has given us new hoof products. With products like these available for the horse today, even Grandpa would approve!



DENTISTS TURNED HOOF RESEARCHERS. Dr. Richard Shakalis and Dr. John Pautienis are researchers for SBS Equine Products.