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HARMFUL EFFECTS OF SHOEING
(Abridged)

Motivation:

A barefoot horse is capable of performing all the tasks that could be expected of a horse, without requiring any kind of protection of the hoof, PROVIDED that the hoof has not been weakened or deformed by the actions of man through unnatural treatment and living conditions.

When looking at literature dealing with hooves, the one constant reference is the damaging effect of shoes. For about 200 years, the ill effects of shoeing have been increasingly documented.

The textbook written by I.C. Gross, teacher of shoeing at the Royal Veterinary School of Stuttgart, clearly states in the preface that "the question of whether shoeing is the means by which to keep hooves sound, is to answered in the negative."

The fact that two of the main causes of the reduced life expectancy of domestic horses (in Europe, about 1/3 of the natural lifespan) are hoof and leg problems is disturbing and should be cause for research.

Scientific Publications:

That hooves are as hard and resistant to wear as the ground to which they become accustomed is ancient knowledge, already put into writing 2400 years ago by Xenophon, military leader of the Greek cavalry. The argument that "our trails are so rocky, the hooves wear down too much" is thus made invalid, since it is not the hoof, but the living conditions of the horse that cause the problem. Xenophon's observations have been proved many thousands of times over; in more recent times (1986), Alexander and Colles once again reminded the riding and veterinary community of this truth with their article "Shoeing--an unnecessary evil" in the American Equine Veterinary Journal.

Bracy Clark, scientist at the London Veterinary College around 1800, found out that every shoe, no matter how correctly applied, inevitably forces the hoof to contract from year to year. He moreover lamented the fact that the books on equine anatomy portrayed these deformed, contracted hooves as sound hooves, since his veterinary colleagues obviously studied only the (sick) hooves of their patients, not sound hooves. This problem, unfortunately, is still largely present today: there is rarely a hoof shown in veterinary or farrier textbooks which is not a contracted hoof, yet described as a normal, sound foot.

DVM Zierold, under Professor Lungwitz in 1910, examined and compared the corium of shod and never shod horses, and found significant differences in structure, in that the corium of a shod horse is of a quality which makes the connection to the hoof capsule less stable (a factor in laminitis, for example).

Luca Bein, in his 1983 dissertation in Zurich, measured the shock absorption of barefoot, shod, and alternately shod horses. He concluded that a conventionally shod horse shows an absence of 60-80% of the hoof's natural shock absorption. He demonstrated that "a shod foot on asphalt at a walk receives THREE TIMES the impact force as an unshod horse on asphalt at the trot." Bein also found that a shoe

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vibrates at about 800 Hz, damaging living tissue.

Dr. C.C. Pollit, at the University of Queensland, Australia, showed in his 1993 study of circulation in the hoof that a shod hoof is not supplied with blood in the normal fashion, but through an alternate route.

Professor Smedegards' publications make clear that shoeing prevents the hoof mechanism from working, if for no other reason that the horse is forced to walk unnaturally (the whole hoof impacts the ground at the same time, and the horse cannot break over naturally). A normal hoof contacts the ground first at the rear and side, then breaks over.

So from various sources throughout history, we can see it is known that;
1. shoeing causes the foot to become contracted (Clark)
2. shoeing causes a deviance of the normal laminae structure (Zierold)
3. the impact forces with each shod step are much greater, and the vibration of the shoe is damaging (Bein)
4. circulation is decreased through shoeing (Pollitt)
5. the side walls, at the widest part of the hoof, have to be able to move outward (Smedegard)

All these are veterinary professionals, though there are many other scientists who have added interesting dissertations to this topic.

Personal Observations:

"Hoof mechanism" is the term given to the movement of the hoof capsule. It has long been known and measured that, when weightbearing, the downward force of the skeleton on the front wall of the hoof capsule forces the coronet band, at its highest point, to sink downward and inward. This illustration is well known and accepted.

However, the downward-inward movement of the coronet band is possible only if the neighboring side walls can move outwards, or can sink into soft ground. This movement is coupled with the flattening of the concave sole, which makes room for the descending coffin bone.

This way, the solar corium is not bruised but rather is relaxed, and the capillaries in the sole and wall fill with blood. It is also known, and clearly illustratable (through infrared photography) that shod feet are cool, whereas unshod feet are warm.

This means that, at the widest part of the hoof (not only in the area of the heel), a considerable expansion of the hoof capsule takes place upon weightbearing. The wall expands NOT ONLY in the rearmost third of the hoof, as shown in many textbooks. Elementary pythagorean geometry supports this. For a normal warmblood, the concave sole must sink down about lcm, which necessitates an expansion of the wall of about lmm to each side. At higher speeds, the bulb of the heel contacts the ground first, which adds to the widening of the foot. Repeatedly, expansion of up to 4mm to each side have been found through live 'prints" at the trot and canter.

A shod hoof is unable to expand as necessary, the concave sole cannot draw flat, and the solar corium is bruised as a result. When trimming such hooves, these bruises become visible.

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To get back to L. Bein's findings on shock absorption. The expansion of the hoof capsule complete with the flattening of the sole absorb up to 80% of the impact force. In terms of physics, this is conversion of of energy through reversible deformation.

The consequences of the lack of up to 80% of shock absorption are widely known as arthritis, tendonitis, etc. The damage done is all the greater when the horse is young, and the still-developing coffin bone is handicapped in its development to proper size through shoeing. Shoeing a horse under 3 (or even 2) years results in crippled and deformed coffin bones and steep, contracted hooves.

The negative effect of shoes on joints and tendons is increased through stresses during motion, ie. the weight of the shoe stressing the joint and tendon through centripedal force. The heavier the shoe, the greater this force.

The contracting effect of shoes increases from day to day, since the hoof grows continually, not straight down but in a conical shape. The hoof grows in width, but the shoe does not; after a month, the hoof grew by 1 cm, in length and width; with a shoe, only in length, forcing a constriction of the corium.

That a horse with such damage is still able to walk is due largely to the fact that the nerves have mostly become non-functional. As soon as the shoes are removed, circulation begins to return, and after a while the nerves "come back to life." So the damage will be present for years before the horse goes lame (due to inflammation, which brings circulation, and as such nerve activity).

The lack of circulation grows more severe with lack of movement. A shod horse which is worked all day tilling the field, for example, has better circulation than a shod horse standing in a box stall and ridden an hour a week.

With a reduction of circulation, metabolism at a cellular level is also adversely effected. Excess protein is not used in the building of tissue (ie. horn) but builds up in the organism (laminitis, etc.)

The results of vibration have not yet been studied in horses. In human medicine, comparable effects exist in people working with vibrating tools such as saws, etc. Raynaud's Syndrome, a condition showing alteration in blood vessels, is one of the problems associated with vibration. Laminitic horses show comparable alterations in their blood vessels, so vibration of shoes may be a factor in this.

Shoes change the way the horse's foot meets the ground. On soft ground, into which they sink, they have a stronger than normal breaking action; on rock, asphalt and ice, they slip unnaturally. These unnatural actions have to be compensated for by muscles and ligaments, and can eventually lead to shoulder and hip problems. Logic would tell us that it is nonsensical to treat the symptoms without removing the cause.

A reduction of the damaging effects is found in horses whose hooves are regularly exposed to water, so that the horn can at least retain its elasticity. This explains to a great deal the seemingly problem-free, long period in which a horse may be ridden while shod: highly active lifestyle in a wet climate.

Today, many hooves are brittle and dried out to the point of having lost their natural

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elasticity, which by itself can lead to shock absorption and circulatory reduction.

There are no statistics about lasting damage from the kicks of shod horses; certain is that many people would be alive if the horse's hoof which caught them in the head had not been shod.

Orthopedic shoes are heavier, more tightly attached, and the already damaging effects are magnified on an ill foot. Pressure on the frog or the sole causes a steepening of the coffin bone through the horse's attempt to evade the painful pressure. The result is that the angle between coffin bone and middle phalanx decreases. The digital arteries are squeezed shut just outside the coffin bone. This gives a good deal of relief from pain, since the nerves are prevented from working, but healing is obviously not a consequence of this situation. This is especially true of the wedge pads.

A lesser, but still existent evil is the damaging effect of nails, vibrating inside the horn capsule.

EFFECTS OF "PROPER" SHOEING:

1. CONTRACTED HOOVES - the hoof meets the ground in a different way, since the horse is trying to evade the pain in the heel area, leads to muscle, tendon, and joint problems

2. BRUISING OF CORIUM - leads to lack of circulation, changes in metabolism leading to decreased horn formation and poor quality of horn, problems in the laminae, lack of sensation in the sole leading to tripping, etc., suspected problems in the metabolic rate of organs

3. INCREASED IMPACT FORCES - lead to bruising, tearing, strains with morphological changes in the corium, the hoof cartilage and joints, tendons, even hoof cancer

4. VIBRATION - leads to similar damages as in humans (vascular changes; Raynaud's disease)

5. WEIGHT OF SHOES - puts strain on the joint capsules and leads to periostosis, arthritis, and increased damage on injury

6. CHANGE IN IMPACT - unnatural mechanics lead to muscle and tendon damage

7. NAIL HOLES - destroy the horn wall and decrease elasticity

8. METABOLISM DISRUPTIONS - lead to organic damage

In every case, shoeing presents unnecessary harm to the horse--unnecessary, if the horse's biological needs are met.

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