Improving Hoof Health through Nutrition

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There are three main influences on the condition of the horses hoof:

1. Genetics - Influence on horn production, horn quality and hoof form
2. Nutrition - Influence on horn production and hoof horn quality
3. Environmental influences:
    a. Humidity, temperature, faeces and urine in beddings;
    b. Work of the horse and quality of the soil;
    c. Hoof care and farriery

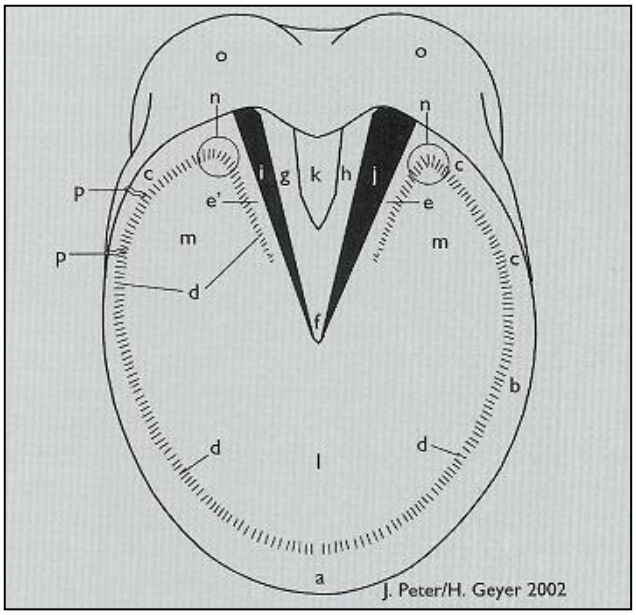

Fig 1. Solear surface of the horn capsule of a left fore hoof

a. coronary horn, dorsal part;
b. coronary horn, lateral part;
c. coronary horse in the quarter;
d. white line;
e. medial bar; e'. lateral bar;
f. tip of the frog;
g. lateral ridge of the frog;
h. medial ridge of the frog;
i. lateral groove of the frog;
j. medial groove of the frog;
k. central groove of the frog;
l. sole anterior part;
m. sole posterior part;
n. palmar angle;
o. heel horn;
p. cracks in the thin wall of the lateral quarter.

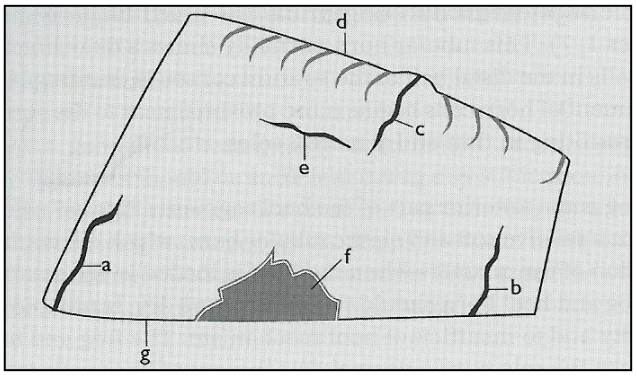

Fig 2. Lateral view of a hoof with hoof horn changes

a. longitudinal crack = sand crack at the toe;
b. sand crack at the quarter;
c. proximal crack which comes from the
d. coronary border;
e. transverse crack;
f. broken-out area near the bearing
g. border.
h.

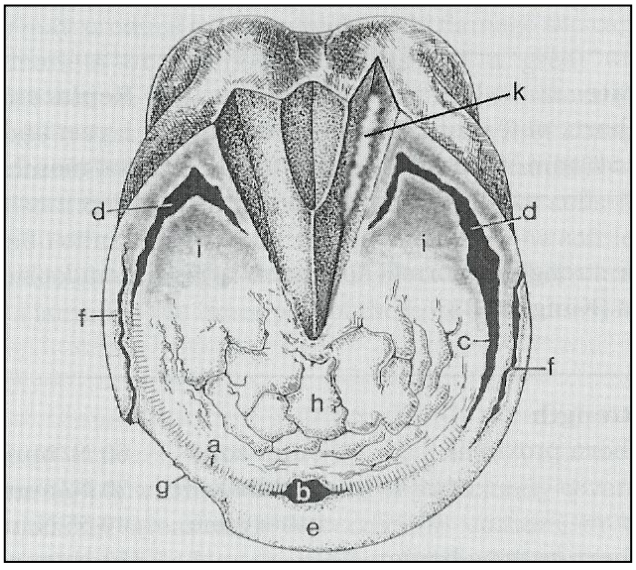

Fig 3. Solear surface of a fore hood with pathological changes (Geyer, H, 2005 from Josseck et al., 1995)

a. normal white line;
b. soft parts of the white line at the toe;
c. soft parts of the white line at the medial part;
d. soft parts of the white line at the bearing border;
e. normal coronary horn at the toe;
f. cracks in the lateral and medial part of the coronary horn;
g. broken out part of coronary horn;
h. crumbly horn in the anterior part of the sole;
i. crumbly sole horn near the palmer angle
k. medial groove of the frog with thrush

Feeds and their influence on the condition of the hoof horn

Recent studies have demonstrated encouraging results where nutrition or nutritional supplements can improve hoof conditions in horses.

Proteins and amino acids

- Sufficient protein supply is required for good hoof-horn quality.
- Supplements of methionine are frequently recommended as well as protein sources gelatin or sulfur components as sources for the keratin-synthesis. However, in a recent article by Kempson (2005), methionine was discussed as being vital for the healthy horse but highly toxic in excess. The effect of excess methionine on the hoof horn was discussed as being the progressive degeneration of the hoof horn, spreading outwards from the white line. The horse will apparently be intermittently lame, with sore feet and have difficulty holding the shoe on for more than a few days. Excess methionine is suggested to cause a depletion of zinc, copper and iron and can lead to growth of weak, parakeratinized horn, typical of zinc deficiency. A well-balanced diet containing adequate protein levels (10-12% protein) will not be deficient in methionine, so further justification for supplementation may be questionable.

Carbohydrates

- In order to prevent laminitis, carbohydrate-overload should be avoided.
- Grains such as corn and barley are high in indigestible starch and should be minimized in the ration.
- Fructans from pasture can have the same effect.

Minerals

- *Calcium* supplementation may be required, depending on the amount already provided in the ration. Diets based on oats and pelleted feedstuffs may contain high quantities of phosphorus as phytate, which will block the absorption of calcium from the intestines. A deficiency of calcium will cause a crumbling of the hoof horn, particularly around the nail holes and general collapse of the heel horn (Kempson, 2005). A good source of calcium is lucerne, which is readily absorbed by the horse.
- Researchers have also suggested that high levels of inorganic *zinc* could improve hoof condition (Coenen and Spitzleik, 1996).
- *Copper* has also been shown to be associated with hoof condition in other species, with copper deficient cattle showing more heel cracks, foot rot and sole abscesses (Puls, 1984).
- Excess *selenium* may result in decay of the hoof horn near the coronary border (Meyer and Coenen, 2002). Since feeding supplementary selenium has become fashionable, more and more horses with poor quality horn are showing signs of selenium toxicity (Kempson, 2005).

Vitamins

- Vitamin A plays a role in the development and maintenance of epithelial cells and horn tissue. The daily requirement of about 40000 units Vitamin A is met by most rations with a small supplement.

Biotin

Several studies have shown that biotin supplementation improves hair coat and hoof strength and decreases incidence of heel, heel-horn junction, and sidewall horn cracks and lameness in swine fed corn-soybean diets (Bryant et al., 1985), is of benefit in some cases for human fingernails (Irving, 1978) and therefore may be of benefit for horses. Horses with thin, brittle hoof walls, cracks, and open white lines prone to infection have been reported to display marked improvement within five months of giving 15mg biotin/day to Thoroughbreds and twice this amount to drafts (Comben et al., 1984, Wintzer, 1987). Improvements were noted but there were no controls. Biotin supplemention has also been shown to be of significant benefit in a double blind study of 42 Lipizzaner stallions, 90% of which had hoof conditions described above (Linden et al., 1993). In this study, 26 horses were fed 20mg per day d-biotin for 2.5 yrs, and by 14 months overall hoof condition was 30% better in biotin supplemented horses. It took 6 months before signs of improvement occurred, and 19 months for an improvement in white line condition, horn histology and an increase in hoof tensile strength to occur. There are other studies which describe biotin only being beneficial for specific defects. Despite previously mentioned data on methionine supplementation, tensile strength measurements in horses have been shown to reach higher values following supplementation with a combination of biotin, zinc and methionine compared to biotin alone (Munzinger, 2005).

The secret of good nutrition is a balance. With equine nutrition the key is: keep it simple, keep it natural and keep it balanced. Hoof condition will improve and the horse will shine. For further information on nutritional manipulation of rations for improved hoof condition, please contact Equine Consulting Services at info@equineconsultingservices.com.au or 0418 488 718.

References

Much of the reference material presented in this document was sourced from:

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