



## FEIF Hoof Study – Press Release

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### **The FEIF Hoof Study group has finished the study and the results were presented at the FEIF conference in Reykjavík Iceland**

The FEIF hoof study was conducted in order to provide objective data on which the FEIF TaskForce can rely while revising the current shoeing rules.

The study group has evaluated the shoeing and hoof health of 134 Icelandic competition horses, randomly selected at 4 international events in 2012 (International breeding show in Herning (HE), DK; Landsmót (LM) in Reykjavík, Iceland; Nordic Championships (NC) in Eskilstuna, Sweden; Mideuropean Championships (EC) in Wehrheim, Germany). The horses were subjected to manual measurements and radiographic examination.

The results showed that horses with a dorsal hoof wall length of 80 mm had sound hooves (no pathology) with a probability of more than 90%. Conversely, almost all horses with a dorsal hoof wall length of 95 mm or more had pathology in the form of flares, uneven height of the quarter walls, broken hoof-pastern axis and atrophied frogs.

Most of the Icelandic horses were overall toed out (89%) in the forelimbs with an external rotation of the carpus combined with an internal rotation at the level of the fetlock. About 69% showed a knock-kneed conformation in the front limbs and about 75% were cow-hocked.

The horses had a mean ( $\pm$  SD) dorsal hoof wall length of  $89 \pm 7$  mm in the front hooves and  $86 \pm 6$  mm in the hind hooves. The hoof pastern axis was correct in only 17% of the studied horses; in 71% it was broken backward in at least one limb.

The shoeing of the horses in the study was comparable to the shoeing of 13 competition horses tested in a study on a treadmill instrumented for gait analysis at the University of Zurich. The tests performed on these 13 horses showed that high, long hooves led to significantly higher limb impulses and higher torques at breakover [1; 2].

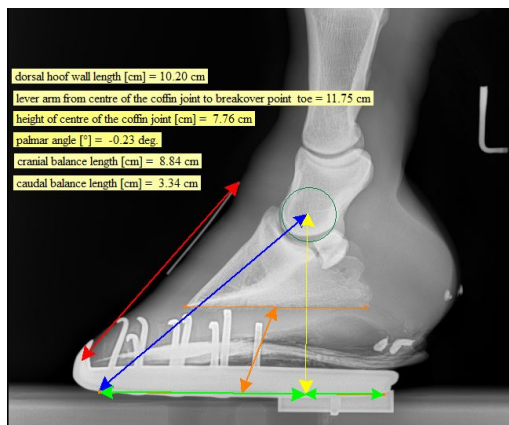
Apart from these increases in limb loading, high, long hooves changed the footfall rhythm towards a more regular four-beat at the tölt (made the horses less pacy), extended the suspension phase at the trot and increased the height of the forelimb flight arc. The longer toe additionally reduced stride frequency and increased breakover duration in all studied gaits [1;2].

Additional weight-boots further increased the height of the forelimb flight arc and improved the four-beat rhythm (unpublished data). The biomechanical consequences of the shoeing manipulations were most obvious at the tölt.



The 13 horses from the treadmill study were re-shod respecting normal shoeing standards. A tolerance interval of the different parameters was calculated to allow for individual variation. When comparing the horses of the FEIF hoof study to this tolerance interval of normal hoof dimensions, it showed that 43% had a dorsal hoof wall length and 51% had a cranial balance length, which was larger than indicated, by the tolerance interval. This implies that half of the study horses were likely to have an increased load of the deep digital flexor tendon and navicular bone, due to larger forces during breakover resulting from the longer lever arm (Fig. 1).

Only minor differences could be shown between sport and breeding horses; but when comparing the four competition sites, the horses at Landsmót had a significantly longer mean dorsal hoof wall in the front hooves ( $94 \pm 6$  mm versus HE:  $89 \pm 6$  mm; NC:  $88 \pm 6$  mm; EC:  $87 \pm 6$  mm) and in the hind hooves ( $89 \pm 6$  mm versus HE:  $84 \pm 4$  mm; NC:  $84 \pm 5$  mm; EC:  $85 \pm 5$  mm). Furthermore, the horses at Landsmót had a poorer cranio-caudal balance with a significantly increased cranial balance length ( $78 \pm 6$  mm) compared to the other competition sites (HE:  $71 \pm 5$  mm; NC:  $73 \pm 5$  mm; EC:  $72 \pm 7$  mm). There were no differences between competition sites regarding height at the withers and estimated weight of the horses.



**Fig. 1:**  
**Radiographic measures:** **Red:** Length of the dorsal hoof wall; **blue:** Lever arm from centre of the coffin joint to breakover point at the toe; **orange:** Palmar angle; **yellow:** Height of the centre of the coffin joint; **green:** Cranial and caudal balance length.

In **conclusion**, the results of the study confirmed that the hoof dimensions of many competition and breeding horses shod according to the current FEIF shoeing rules did not correspond to those of a normal shoeing. Cranio-caudal balance was changed in many horses towards a longer dorsal hoof wall and a longer cranial balance length which were associated with the increased occurrence of hoof pathologies. As it could be shown in prior gait analysis, high and long hooves do improve gait performance regarding a clearer four-beat tölt, a longer suspension phase at the trot and a higher forelimb flight arc, but at the same time lead to higher loads and stresses of distal limb structures.



## References

- [1] Waldern, N.M., Wiestner, T., Ramseier, L.C., Amport, C. and Weishaupt, M.A. (2013) Effects of shoeing on limb movement and ground reaction forces in Icelandic horses at walk, tölt and trot. *Vet J* **198 Suppl 1**, e103-108.
- [2] Weishaupt, M.A., Waldern, N.M., Amport, C., Ramseier, L.C. and Wiestner, T. (2013) Effects of shoeing on intra- and inter-limb coordination and movement consistency in Icelandic horses at walk, tölt and trot. *Vet J* **198 Suppl 1**, e109-113.