

8. SUMMARY

Hoof pressure measurement in horses: a proof of the effects of elevating the heels as a therapy of the acute laminitis.

One kind of therapy for the treating of the acute laminitis in horses has been discussed elevating the heel of the horse to avoid the rotation of the third phalanx. Because of the bad influence of the prognosis, horses with laminitis are treated with an artificial elevating of the heel. The effects of that elevation were the aim of that work, trying to make conclusions about that subject.

In the first part of that work I present a historical summary of the different hoof pressure measurement techniques and a short introduction in the basics of physics and dynamics. An overview of acute laminitis follows presenting a retrospective of know-how and possibilities of treatment.

This work is divided into two parts, one measuring the hoof pressures under flat feet and one under feet which were elevated in the heel region. Two groups were created, one defined as the static group (prepared legs measured in a special pressure machine) and the other defined as the dynamic group (horses, which were measured in standing position).

Each measurement had to be repeated three times and those three results were averaged, because of the hazard error of the measurement technic. 30 legs were used for the static component and 30 horses for the dynamic component.

The aim of that work was to get informations about the hoof pressures (in kN) under all 4 receptors (together) and under each receptor (each quadrand of the sole) and to draw conclusions about them. Further, the percentage of body weight or hoof pressure repartition under each receptor and for different axis (lateral/medial, dorsal/palmar) had to be calculated. The effect of the heel elevation had to be compared with the flat footing.

- **Results of the static group:**

The averaged results of the static measurements **without elevation** are 0,28 kN under the lateral toe, 0,26 kN under the lateral heel, 0,27 kN under the medial heel and 0,26 kN under the medial toe. The 4 receptors together are giving a pressure of 1,07 kN (the general

pressure under the hoof). Calculating the percentage of pressures we can find a harmonic repartition all over the hoof, the lateral axis has about 1% more pressure than the medial one.

Taking the same legs but this time **with elevation** of the heel, the results change to 0,06 kN under the lateral toe, 0,50 kN under the lateral heel, 0,46 kN under the medial heel, 0,06 kN under the medial toe. The addition of those 4 receptors also has a pressure of 1,07 kN. The percentage of pressures are really changing here, increasing to 43% under the lateral heel, 46% under the medial heel and lowering to 5% under the lateral and medial toe. Here the lateral axis shows here a higher pressure amount of 2% (compared with the medial axis).

- **Results of the dynamic group:**

The averaged results of the dynamic measurements of **legs without elevation** are 0,37 kN under the lateral toe, 0,34 kN under the lateral heel, 0,29 kN under the medial heel and 0,31 kN under the medial toe. The 4 receptors together are giving a pressure of 1,31 kN (the general pressure under the hoof). The percentage of pressures shows a harmonic repartition all over the hoof, the lateral axis has about 9% more pressure than the medial one.

Taking the same **legs** but this time **with elevation** of the heel, the results change to 0,12 kN under the lateral toe, 0,63 kN under the lateral heel, 0,48 kN under the medial heel, 0,07 kN under the medial toe. The addition of those 4 receptors also has the same pressure of 1,31 kN. The percentage of pressures shows a significant change in the repartition: 9% under the lateral toe, 5% under the medial toe, 48% under the lateral heel and 36% under the medial heel. Even here we can see an increased pressure repartition under the lateral axis of 16% (compared with the medial axis).

This work shows how the effects of an elevation of the heel influence the hoof pressures: the toes are lowering pressure and the heels are increasing pressure.

- **Results of horses with laminitis**

The averaged results of horses with laminitis (**legs without elevation**) are 0,38 kN under the lateral toe, 0,53 kN under the lateral heel, 0,44 kN under the medial heel and 0,25 kN under the medial toe. The percentage of pressures clearly shows an increased pressure under the heel of 62% of the hoofpressure and of 37,5% under the toe.

Once horses were measured with an elevation of the heel, the results change: the **legs with elevation** show pressures of 0,18 kN under the lateral toe, 0,70 kN under the lateral heel, 0,59 kN under the medial heel and 0,14 kN under the medial toe. The heels take about 81% of the vertical hoof pressure, the toe takes 19%.

Horses with laminitis show an increased pressure under the heel, even without any raising of those heels. Elevating those heels creates an further increase under the heels and a decrease of pressure under the toe. It is worth mentioning that the increase of pressure under the heels of horses with laminitis is about the same rate as for lame horses.