TO SHOE OR NOT TO SHOE?: THAT IS THE QUESTION

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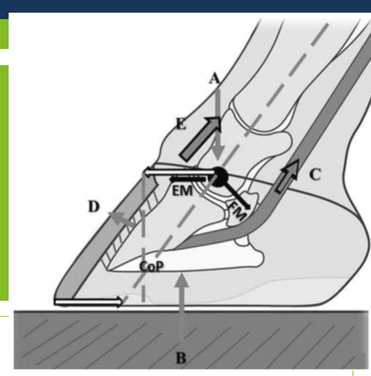


Take Home Message

'No hoof, no horse' (Burg *et al*. 2007).

Hoof management decisions have major implications towards the development of injury and lameness, training effectiveness and performance.

Introduction

There is limited research available relating to the potential effects that shod and unshod conditions have on equine kinetics and kinematics. Seven horses were used to evaluated how shod and unshod conditions effect joint kinematics, protraction and retraction, hoof slip, hoof angle, proximal and distal spring leg length changes and ground reaction forces in both the forelimbs (FL) and hindlimbs (HL) during trot on a concrete surface. This study also investigates whether there is a correlation between hoof angles and protraction and retraction within the FLs and HLs during trot.

Methods

- 7 sound horses. Hoof angle was measured on FL and HL in all of the horses unshod and newly shod.
- Hemispheric reflective markers were attached to the skeletal landmarks of the FL and HL and on the dorsal aspect of the hoof wall of each horse while shod and unshod
- Each horse was trotted 4 times along 6 meters on a flat, concrete surface unshod and shod (3 most clear and efficient videos were used).
- A high speed camera (2350Hz) was used
- The following parameters were calculated from the data collection during video analysis, using Quintic Biomechanics Software, in both shod and unshod horses; joint kinematics, protraction and retraction, hoof slip, proximal and distal spring leg length changes, and the estimated peak vertical ground reaction forces (GRF).
- In both the FLs and the HLs the maximum extension of the MCP joint was analysed during the stance phase for shod and unshod conditions. McGuigan and Wilson (2003) calculated the equation of the linear regression line for the relationship between limb force and MCP joint angle at trot. This was used to predict the value of the peak vertical GRF associated with the peak MCP joint angles.
- Statistical analyses were carried out on SPSS software (version 24).

Results

Forelimb joint angles and ROM: Shoulder flexion significantly greater in unshod horses.

Hindlimb joint angles and ROM: No significant differences between shod and unshod horses.

Protraction and Retraction (FLs and HLs): There was a significant increase found in forelimb protraction in unshod conditions (Fig 1).

Hoof Angle and Slip: it was evident there is an increase in the overall slip in shod horses compared to unshod horses and overall more slip experienced in the hindlimbs in both shod and unshod conditions compared to the FL (Fig. 2).

Correlations between hoof angle and protraction and retraction: No statistical significant correlation between hoof angles and protraction and retraction.

Proximal and Distal spring leg length changes in shod and unshod horses: There was a significant increase in both the FLs and HLs proximal limb spring length during both the mid stance and strike phase in shod compared to unshod conditions (Fig. 3).

Peak Vertical Ground Reaction Forces: It was found that the application of shoes statistically significantly increases the peak vertical GRFs in the FL (Fig 4).

Figure 1

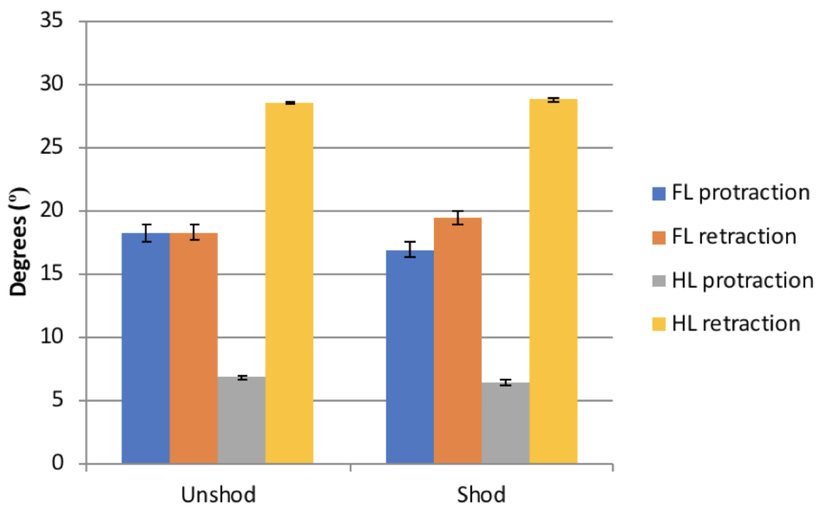


Figure 2

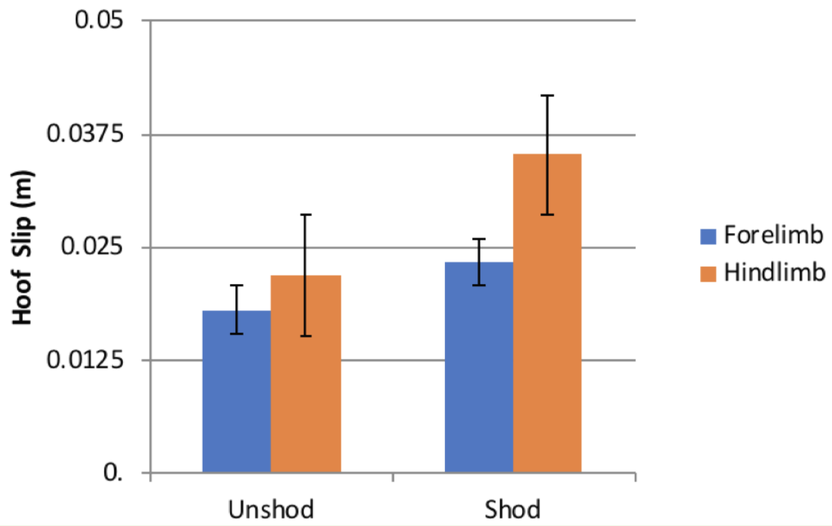


Figure 3

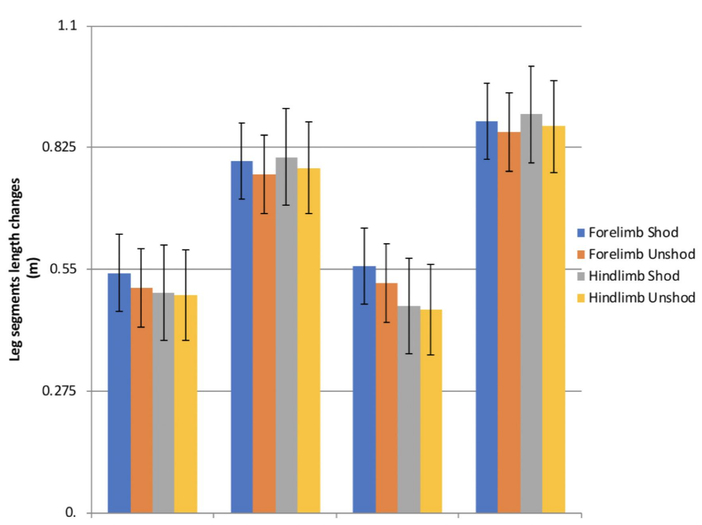
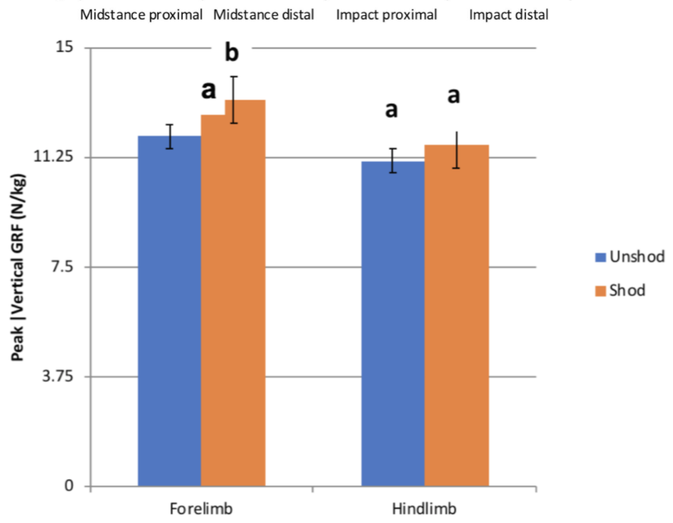


Figure 4



Conclusions

The findings indicate that both shod and unshod conditions have positive and negative impacts. Acknowledging these effects can help to understand what is the better for each animal: shod or unshod?

References: McGuigan, M. and Wilson, A. (2003). *Journal of Experimental Biology, **206** (8), pp.1325-1336.* Stutz, J., Vidondo, B., Ramseyer, A., Maninchedda, U. and Cruz, A. (2018). *Veterinary Record Open*, **5** (1), p.e000237.