

Locomotion analysis of horses wearing FlowBoots

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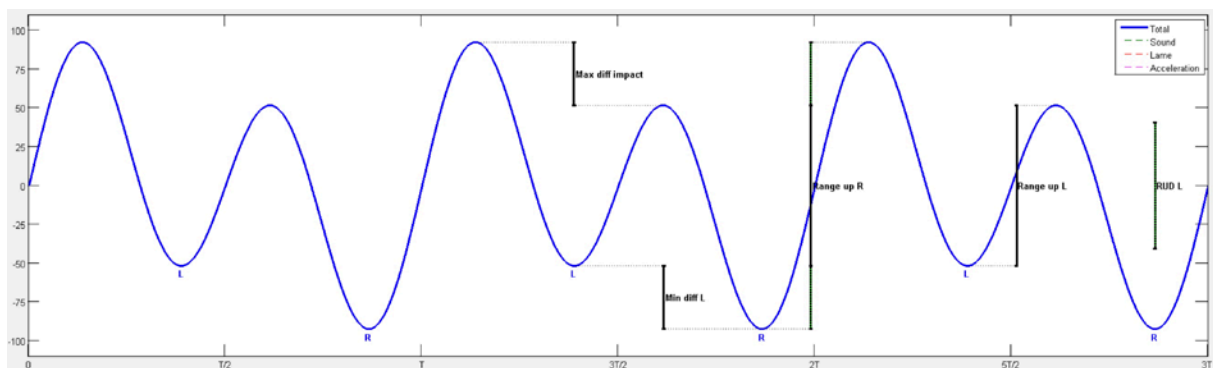
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METHODS

Three horses were tested trotting on a straight line without and with FlowBoots on both forelimbs and unilaterally on the left and right forelimb, respectively. Horses were equipped with optical markers on the head, withers, croup, cannon bones and hoofs on the forelimbs. These markers were tracked optically with 20 high speed video cameras (Oqus, Qualisys AB) and 3D position of each marker were reconstructed in Qualisys QTM-software. Data were then analysed with respect to well-established key parameters quantifying left/right asymmetry (signs of lameness). More specifically the vertical excursion of head, withers and pelvic markers were compared in a left versus right symmetry perspective. Details describing the calculated parameters are shown in Figure 1.

Figure 1. Illustration of how the variables Max diff impact, Min diff L, Range up R and Range up L are calculated. (diff max/min and range up diff Vectorsum are the length of the vector created by plotting head diff max and min orthogonally against each other).



All three horses showed a very slight but uniform tendency to bear more weight on the limb equipped with a FlowBoot when comparing the two unilateral set ups in each horse. This could be defined as creating a “lameness” on the contralateral limb, since this limb consequently took less weight. This was shown by the number of strides that was considered more right versus left loaded in each trial and with left/right height difference.

Table 1. Left versus right symmetry in forelimbs measured as mm difference in vectorsum and number of strides defined as left / right less weight bearing (lame).

		Head left		Head right	
		mm	%	mm	%
Horse 1	l	19	29	42	71
Horse 1	r	25	32	27	68
Horse 2	l	35	45	35	55
Horse 2	r	31	53	25	47
Horse 3	l	29	37	28	61
Horse 3	r	48	48	27	50

If these findings stayed consistent in a larger sample of horses it could be speculated that there is more weight bearing on the limb equipped with the FlowBoot either due to tactile stimulation or else that the horse may feel some degree of comfort in wearing the FlowBoot and thereby loads that limb more. It must be strongly emphasized that there is no possibility to generalize the current findings to a larger population based on the present findings both due to the small number of horses (n=3) and the very subtle changes seen.

Looking at data of locomotion parameters as a whole, no obvious differences were found between locomotion with compared to without the FlowBoots on either forelimb. The main conclusion from this limited test must therefore be that we have no indications that the boot alters gait when worn on both forelimbs. There are though some interesting data warranting further studies with a larger number of horses.