

# An investigation into the relationship of pelvic misalignment on forelimb hoof size

A. Ireson MSc; J. Ellis MSc; S. Charlton MSc; C. Cunliffe DC PhD

McTimoney College of Chiropractic, Kimber Road, Abingdon, Oxon, OX14 1BZ, UK

## Summary:

**Implications** This study demonstrated a relationship between direction of pelvic rotation and forelimb hoof size (width and length). This should raise potential awareness when assessing pelvic or feet asymmetries.

**Introduction** Pelvic misalignment or pelvic rotation occurs when the most dorsal aspect of the tuber coxae is higher on one side of the horse than it is on the other rather than being level and in alignment. It is a common problem in horses and is a significant cause of lameness, performance breakdown and diminished activity (Weeren and Crevier-Denoix, 2006). Studies investigating the science of lameness and resulting compensation mechanisms suggest that a lame horse, or with a pelvic rotation, attempts to take the weight off the lame limb by redistributing locomotor forces to other limbs, mainly the diagonal limb, Clayton et al, (2001). The occurrence of differently shaped and sized front feet is a commonly encountered fault of which the clinical significance is unclear, Heel et al (2006). The aim of this study was to determine whether there is a relationship between pelvic misalignment in the horse and uneven forelimb hoof size.

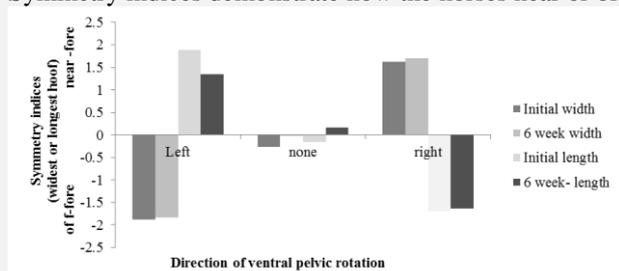
**Material and methods** 30 healthy, sound, multidiscipline horses, regularly shod/trimmed every 6 weeks, were assessed; (10.3years±7.3), height (14.3hh±2.1). Pelvic height measures were taken from the dorsal aspect of the tuber coxae to level ground when stood square, using a plumb line and measuring stick. Ventral pelvic rotation was calculated, left or right. A 300mm digital vernier calliper measured foot dimensions. Hoof width (lateral to medial edge) and hoof length (dorsal to palmar edge), were measured of both fore feet, prior to and after farrier trim, at two consecutive 6 week shoeing intervals by the farrier blinded to pelvic measures. Both methods were tested for reliability and repeatability. Statistical analyses of data sets included chi-squared, symmetry indices and one-way ANOVA.

**Results** Left ventral pelvic rotation was evident for 13 horses, right ventral pelvic rotation for 12 horses and no rotation for 5 horses. Horses with a ventral pelvic rotation resulted in more hoof growth (width) on the contralateral forelimb and more hoof length on the ipsilateral forelimb over a 6 week shoeing interval period.

**Table 1** Pelvic rotation direction relationship to mean hoof growth measures(mm) ± s.e for 6 week period

Ventral pelvic rotation	Increase in hoof width		Increase in hoof length	
	Near fore	Off fore	Near fore	Off fore
Right	3.9±0.3	1.8±0.4	3.4±0.5	5.7±0.5
Left	3.2±0.3	5.3±0.6	4.5±0.5	2.8±0.4

There was a significant relationship between uneven hoof width and pelvic rotation directional ( $P<0.001$ ); a significant relationship between uneven hoof length and pelvic rotation directional ( $P<0.001$ ). Over a 6 week period, there was a relationship between amount of hoof width growth ( $P<0.001$ ) and hoof length growth ( $P<0.001$ ) with pelvic misalignment. Symmetry indices demonstrate how the horses near or off fore-hoof was wider or longer in relation to the pelvic rotation.



**Figure 1** Symmetry indices of hoof length and width in relation to ventral pelvic rotation

**Conclusion** This study suggests statistically that alignment of the pelvis does have a significant relationship on width and length growth of horse's fore-hooves. Further study would be beneficial in understanding more the chain of compensatory effects on the equine body and in relation to performance parameters.

**Acknowledgements** There was no external funding for this project

**References:** Clayton, H. 2001 USDF Connection 26, 29-32.

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Published in Advances in Animal Biosciences – April 2014 pp79