

# **Analysis of coffin and shoulder joint lameness with an inertial sensor-based system: impact versus pushoff**

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## **ABSTRACT**

**Reason for performing the study:** An inertial sensor-based system (Lameness Locator® [LL]) can help veterinarians detect mild lameness. It would be beneficial if this tool could also be used to distinguish lamenesses produced by lesions in different structures.

**Hypotheses:** Coffin arthritis predominantly causes impact lameness while shoulder arthritis predominantly causes pushoff lameness.

**Objective:** To investigate if shoulder arthritis causes pushoff lameness and coffin arthritis causes impact lameness and if these lamenesses can be differentiated by comparing the phase angle of the resultant ray calculated by the LL.

**Methods:** Using a crossover design, coffin and shoulder arthritis were alternately induced in 12 horses with intra-articular injection of IL-1 $\beta$ . Immediately before injection and every 6-12 h thereafter, the horses were evaluated with the LL. This evaluation was performed while the horses were trotted in hand in a straight line on a hard surface for about 120m. The phase angle (= arctangent [MINDIFF mean / MAXDIFF mean]) of each type of lameness (coffin or shoulder arthritis) were compared with the Wilcoxon signed-rank test using data from the last time point before lameness was no longer detectable.

**Results:** No difference could be detected ( $p=0.625$ ) between the phase angle when coffin (median, 81°; range, 58-123°) and shoulder arthritis (median, 86°; range, 59-104°) were compared.

**Conclusion:** Coffin arthritis and shoulder arthritis did not consistently cause impact lameness and pushoff lameness, respectively.