## Effect of body position on a 3-dimensional scanning assessment of muscle mass

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Equine performance relies on well-developed musculature which has been difficult to accurately measure. We recently devised a 3-dimensional photonic scan to capture body volume (V) as a proxy for muscle mass validated in horses with 4 hooves square, a difficult stance to achieve. The purpose of this study was to determine the effect of modest differences in body position on measurement of body V. Anatomic markers were placed on 8 horses positioned with; 4 hooves square; neck turned ~25°; head raised mean 17 cm; one hind hoof (HH) anterior offset ~15 cm; a front and opposite HH ~15 cm offset (n=7); one HH resting. A handheld Occipital Structure Sensor scanner connected to an iPad and Skanect and Materialise 3-Matic programs were used to capture V in specific body sectors delineated by anatomic markers. Volume of back and hindquarter sectors standing square were compared to various positions using ANOVA ($P$<0.05) and a t test used to compare the side with altered HH position to the corresponding side when square. Measured hindquarter ($P$=0.22) or back V ($P$=0.17) were not altered by head position. Measured hindquarter V was not significantly impacted by limb position. In contrast, higher measured back V was recorded on the side that had a resting HH ($P$<0.01). In conclusion, moderate changes in head or limb position do not substantially impact assessment of hindquarter volume, however, accurate assessment of back volume requires stances close to square with head height varying within ~17 cm when repeating scans.

## Electrode positioning in the horse: towards standardisation of surface EMG measurements

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Surface electromyography (sEMG) is a well-established method in human gait analysis, and its application has extended towards the equine field in the past decades. However, methodological consensus regarding electrode positioning is lacking, resulting in different user methodologies, hampering study comparison and repeatability. This study investigated the standardisation of bipolar electrode positioning to measure muscle activity in horses during dynamic contractions. Ultrasound scans were made of three muscles (Triceps Brachii caput longum (TB), Longissimus Dorsi (LD), and Semitendinosus (ST)) of six horses to determine the muscle borders and fibre direction. Linear arrays of approximately ten electrodes (4 mm diameter, 20 mm inter-electrode distance) were placed on the clipped and cleaned skin, parallel to the muscle fibre direction. The middle of the array was always placed at 50% between two anatomical landmarks chosen near (one of) the origins and insertions of the respective muscle. Data were collected (SAGA® TMSi, 4,000 Hz) for one minute at trot on a treadmill. The root mean square (RMS) values, innervation zone (IZ) location and presence of crosstalk were determined to evaluate electrode positions. The optimal positions were at 40-49 and 32-45% between the used anatomical landmarks for TB and ST respectively. Electrodes positioned within the thoracic region of the LD recorded higher, i.e. better, RMS values compared to electrodes in the lumbar region, though results were similar regarding IZ location and presence of crosstalk. The proposed positions may serve as a standardised reference for bipolar electrode placement to measure sEMG in horses during dynamic contractions.