Kinematics of gaits in Bardigiano horses

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ABSTRACT

Selection of horses for inclusion in breed registers and for approval as breeding stock is usually based on the opinion of judges. However qualitative gait analysis based on the judgement of an observer carries all the risks inherent in subjectivity. Video-based kinematic analysis quantifies the features of gait: the output is in the form of temporal (timing), linear (distance) and angular measurements describing the movements of the body segments and joint angles. The data are displayed graphically. Kinematic characteristics of locomotion in several horse breeds have been studied. In this preliminary trial an Italian breed in field conditions was considered, with the aim to find a scientific, objective method for gait evaluation during performance test. Gaits represent a challenge for the Bardigiano Stud Book technicians, because the breed selection goal changed recently from work, draft type to saddle horse. 14 retro-reflective, hemispheric markers, diameter 2.5cm, were glued to palpable, anatomically defined locations of the hoof and skin over the left fore- and hind-limbs of 5 Bardigiano mares. The handler kept the lead line loose and the horse performed a relaxed natural walk over a sand surface, normally used for schooling and training. Sagittal plane video data were collected by a digital camera (50Hz) 5 meters far from the horse. Images captured by computer were analysed using SIMI (SIMI Reality Motion Systems GmbH, Germany). In the fore limb were considered the joints: elbow-carpus-fetlock. In the hind limb: stifle-tarsus-fetlock. Parameters observed: stride duration, angular variation, angular velocities of the segments constituting the joint. Mean and standard deviation were calculated. *E.g.* in the hind fetlock the following values were observed: 143° max. flexion (3.64 S.D.) 220° max. extension (3.03 S.D.). No irregularity in gaits was found. The obtained graphs are a first step in the locomotion characterization of an Italian horse breed.

Kinematic techniques in the biomechanics study can provide practical application for lameness quantification and prevention, as well as shoeing, training and performance evaluation. Present trial is a contribute to get ready applications that can be used in field conditions.