ADMINISTRATION OF BIOACTIVE PROTEINS TO MATURE HORSES IMPROVES GAIT KINEMATICS

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Introduction

Despite the widespread use of treatments to manage joint issues in exercising horses, few studies have shown the efficacy of these products. Joint diseases such as osteoarthritis remain the leading cause of early retirement of equine athletes (Todhunter and Lust, 1990). Older, working horses are particularly susceptible to lameness as a result of prolonged exercise and athletic demands (Clayton et al., 2002).

There remains a need for non-invasive treatments for joint disease that can be used in the early stages, prior to the development of physical symptoms. Consumption of serum-based bioactive proteins by multiple species has been beneficial in improving performance and health of the animal. These unique serum-based bioactive proteins fractionated from animal blood can support an efficient inflammatory response and address issues related to stress and gut health (Pérez-Bosque, 2010). However, these have not been evaluated in the horse. The objective of this study was to evaluate effect of orally administered serum-based bioactive proteins (LIFELINE BioThrive™) on gait kinematics of horses.

Materials and Methods

ANIMALS AND TREATMENTS

Thirty mature Quarter horses (439 to 684 kg and 5 to 22 yr) were utilized in a randomized complete block design. Horses were blocked by age and BW and randomly assigned to treatment within block of the 28-d trial.

Treatments consisted of no pellet administered (CON), 240 g/d of pellets containing 66 g of bioactive proteins (Low Dose; LIFELINE, APC, Inc., Ankeny, IA) , or 240 g/d of pellets containing 132 g of bioactive proteins (High Dose; LIFELINE, APC, Inc.). Concentrate was fed individually at 0.5% of BW (as-fed) daily in addition to ad libitum coastal bermudagrass (Cynodon dactylon) hay. Horses were individually administered concentrate and pellets twice daily. Each horse was exercised by a single assigned student 5 d each wk with exercise bouts focusing on horsemanship skills at the walk, trot, and canter for approximately 60 min/d.

Gait analysis video was collected on d 0, 14, and 28 of the trial using procedures described by Huguet and Duberstein (2012). Briefly, prior to image capture horses were fitted with reflective markers on the following joints of the right forelimb: point of articulation between greater tubercle of humerus and glenoid cavity of scapula, articulation of head of radius with humerus, ulnar carpal bone where it articulates with the radius, and metacarpophalangeal joint. Once markers were placed, a calibration measurement was obtained for each horse using distance from the marker located at the humerus/radius to center of the carpus. Each horse was videotaped as they trotted 3 passes over a level, dirt surface with an experienced handler. The frame recorded consisted of markers placed 13 m apart and the camera 10 m from the flight path with the tripod 86 cm high. Camera shutter speed was set at 1/1,000 s. Video from each horse was analyzed using commercial software (EquineTec, Monroe, GA). Each clip was analyzed for stride length using the calibration measurement obtained for each horse to standardize the image. Stride length was measured as distance the right foreleg traveled during the swing phase. Additionally, range of motion (ROM) of the knee was determined using the difference between the maximum and minimum angles observed during each frame of the swing phase.

Data were analyzed using PROC GLM of SAS (SAS Inst., Inc., Cary, NC). The model contained effects for treatment, time, and treatment x time interaction. Day 0 was used as a covariate in the analysis. Significance was declared at $P \leq 0.05$ and $P \leq 0.10$ was considered a trend towards significance.

Results

Figure 1. Means of treatment for front and hind stride length[1,2].

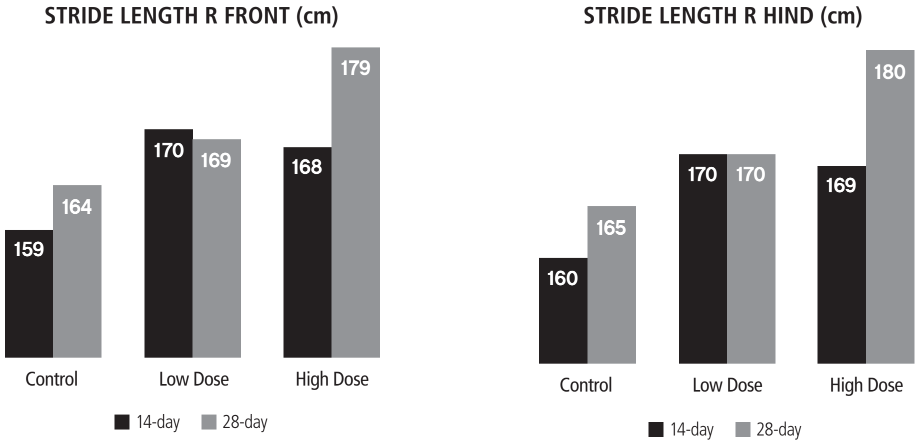
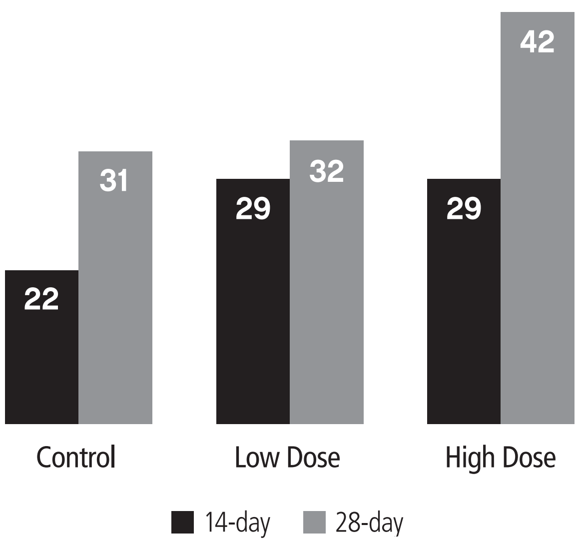


Figure 2. Means of treatment for range of motion[1,2].



[1]P value of linear contrast = P < 0.10.

[2]Least squares means adjusted by d 0 as covariate.

Results

Mean stride length (Figure 1) of the front limb tended to increase linearly (P = 0.07) at d 14 with increasing levels of bioactive proteins. Similarly, at d 28 stride length of the front limb increased linearly (P = 0.05) with increasing dose of bioactive proteins. Stride length of the hind limb tended to increase at d 14 (P = 0.10) and increased linearly at d 28 (P = 0.02) with increasing levels of bioactive proteins. Knee range of motion (Figure 2) increased linearly at d 14 and d 28 with increasing dose of bioactive proteins (P < 0.01).

Conclusions

In conclusion, consumption of bioactive proteins in mature, exercised horses resulted in improved gait kinematics as evidenced by increases in stride length and knee range of motion. The response was dose related.

Literature Cited

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