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**Effects of Horse Rider Weight on Horse Stride Length: A Preliminary Study**

Numerous recommendations for maximum acceptable weight-loads are in use for equine events; however these recommendations lack any scientific support and vary depending on the source and discipline. Many independent equine businesses and organizations in the United States impose a limit of 20% of the horse's body weight (BW) including rider and tack, while in the United Kingdom a limit of 15% BW is considered satisfactory and 20% considered a welfare concern. The Professional Association of Therapeutic Horsemanship (PATH) International recommends a limit of 20% BW for loads carried by therapy horses, but lowers the limit to 15% BW when riders are extremely unbalanced. These weight load limitations are made with the welfare of the horse in mind; however there is a severe lack of scientific data available to support these limitations. The number of people classified as overweight is increasing in the United States; making heavier weight loads a more likely scenario for horses in the U.S. Furthermore, to our knowledge no studies exist evaluating weight loads applied to the American Quarter horse, which is the most prominent breed in the United States. Therefore, the objective of this study was to evaluate the effects of weight applied at 0%, 15%, 20%, 25%, and 30% of the horse's body weight (BW) on stock type horses at the trot using gait analysis software. We hypothesized that the 30% BW load will result in a shorter stride length, and altered range of motion (observed as changing angles in the fetlock joint) compared to carrying 0%, 15%, 20%, and 25% BW.

Eight horses were organized into a 4x4 Latin Square Design, and data for each horse was collected on 4 consecutive days. Each day, horses were filmed at a 0% BW, followed by a randomly assigned treatment weight load of either 15% BW, 20% BW, 25% BW, or 30% BW.

Each horse was walked and trotted in hand with the use of a standard halter and lead rope. The recording frame was 5 m wide, and was preceded by a warm-up distance of 5 m and followed by an additional distance of 5 m (total distance = 15 m). The camera was installed 10 m away from the center of the recording frame and placed perpendicular to the line of travel on a tripod set at 86 cm. Horses were allowed to walk and trot the total distance once before recording in order to warm up. EquineTec computer software program was used for video analysis, and variables analyzed included front and hind leg fetlock angle at maximum flexion (4 replications measured) and front and hind stride length (measured in duplicate). Data was analyzed using SAS statistical software to determine the effects of weight load on fetlock angles and stride length.

Overall, the percentage of weight carried did not impact stride characteristics. When looking at front limb fetlock angle, 0% and 15% BW tended to be greater than 25% and 30% BW ($p = 0.10$). This suggests the horse's fetlock joint was flexing more at the higher weight loads. However, front stride length and hind limb fetlock angle showed no statistical differences, although numerically front stride length increased with increasing weight load carried. For hind stride length, 0% BW load tended to differ from all other weight loads ($p = 0.06$) with stride length increasing with increasing weight load. The increased stride length with increasing weight load was unexpected, and possibly suggests riders weighing over 20% of a horse's body weight are not an immediate welfare concern. More research is needed utilizing a great number of horses

and evaluating weight loads carried over a longer duration and distance to elucidate these observations.

**Figure 1 EquineTec Software video analysis of 20% BW hind leg angles and stride lengths**

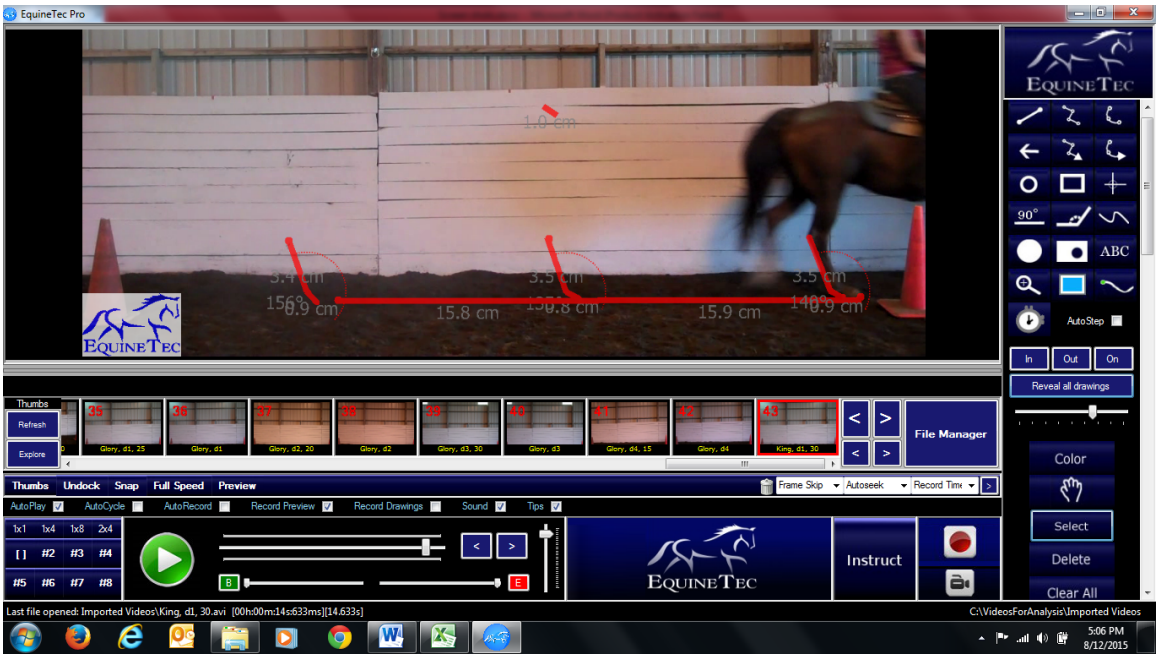


**Figure 2 EquineTec Software video analysis of 0% BW, two front leg angles and one front stride length measurement**

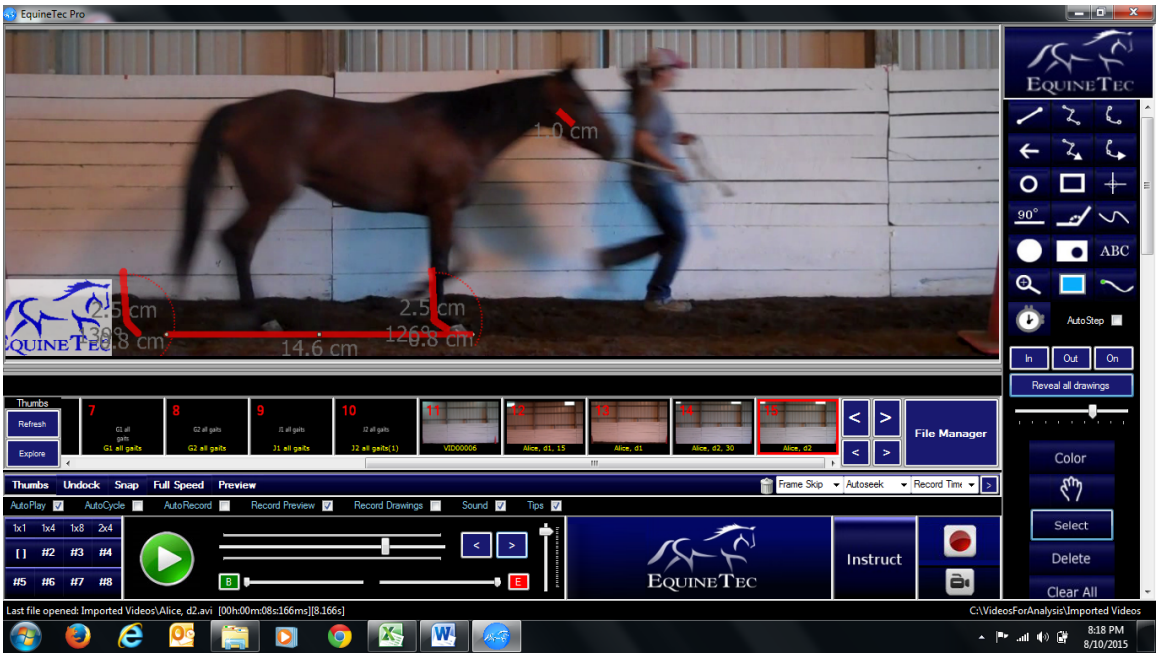

**Figure 3 EquineTec Software video analysis of 25% BW front leg angles and stride lengths**