

Sue Carson Research Days – Results V1

Introduction:

The demands placed on the performance horse have increased over the years. As a result the wastage of sport horses due to injury has also increased. Distal limb injuries denote a large percentage of equine injury however a large proportion of those injuries originate from poor back kinematics. Therefore it is vitally important that back health is addressed and monitored throughout the horse's career.

Centaur Biomechanics:

Centaur Biomechanics founded by Russell Guire is a company which specialises in horse and rider performance analysis. Russell has carried out several studies in equine locomotion, jumping mechanics and saddle fit in relation to performance. To date Russell is the official gait analysts to the British Equestrian Federation (BEF) and works closely with Team GBR and the World Class Development Programme. In addition to this, Russell presents presentations on equine locomotion at international conferences.

Gait Analysis:

Gait analysis is one of the youngest branches of equine physiology which has been investigated, started by Mr Muybridge in 1899, who used a series of cameras to capture the stride sequence. He was the first to show that the trot had a moment of suspension, a fact that is well known today (Marlin & Nankervis, 2002). Since then, technological advancements have meant that new techniques can be applied leading to a surge of interest in to the study of biomechanics. Biomechanics has several applications, primarily research but more recently commercially. To date biomechanics is currently being used as a way of maintaining performance and wellbeing within the horse. Regardless of the performance output, gait analysis, can help identify any weaknesses which left undetected may or may not result in an injury occurring, therefore helping to maintain peak performance and / OR wellbeing. Assessments are being carried out by leading vets and practitioners as a way of monitoring improvements in equine locomotion. One of the main benefits of biomechanics is the quantification of data, by doing this removes the inherent risk of subjectivity, which is apparent during visual assessments.

Study Aim:

Investigate the effect that a Sue Carson saddle has on the equine gait.

Method:

- Sue Carson saddles were fitted to the horse by a qualified saddle fitter.
- Mark up of the horse using 3M reflective tape. Markers were applied to the horse's skin by manual palpation of bony anatomical landmarks identifying segment ends and joint locations see figure 1.

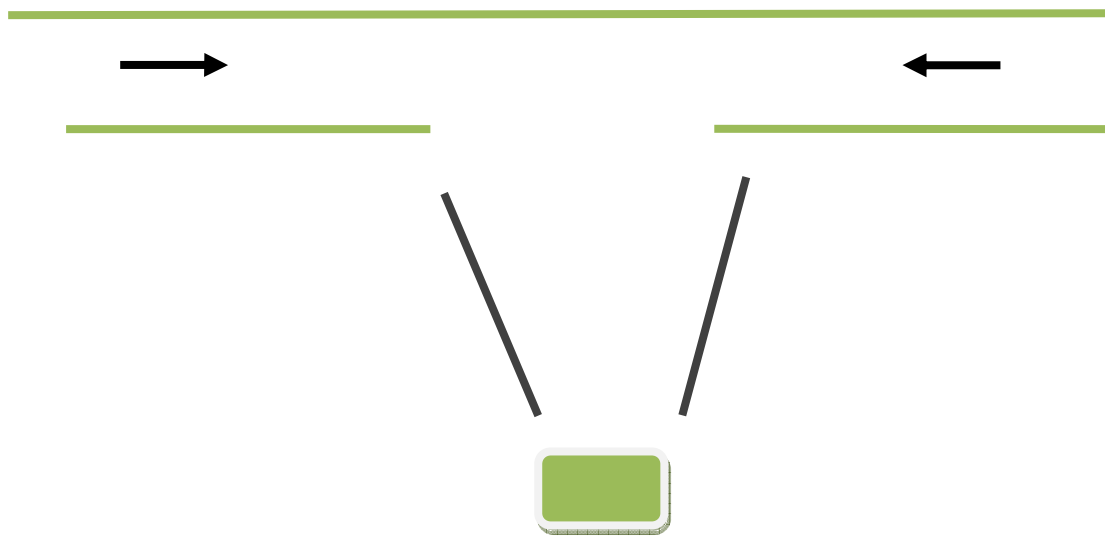
Capturing

- Data was captured using a high speed basler camera capturing at 100 frames per second.
- The testing area was calibrated vertically and horizontally using a board of a fixed known length.
- Data was captured using the sequential capturing facility on the Quintic system.
- All files were then automatically digitised using a 4 point model to track the fore limb and hind limb markers. Data was then exported in to Microsoft Excel for statistical analysis.

Testing Area

- All tests were carried out in an indoor school which had a good firm surface
- A camera was located along the long side of the school, 10 meters (M) away from the testing track.
- 2 Halogen spot lights were used as a means of reflecting the 3M marker tape.
- The field of vision allowed for one stride to be captured
- The rider was briefed to ensure that the horse passed between the two poles which lay parallel to the wall and camera.

System Set Up:



Protocol

Each saddle test followed the same protocol:

- Warm up of the horse, walk, trot and canter
- Two trials left and two trials right were collected whilst trotting or the jump sequence
- Sue Carson saddles were fitted to the horse

Results Henry Boswell

Trial 1 (4 fit, 5 pump atmospheric in back)

Left hind less protracted when compared to the right, indicating less power. (Left 6.02° / Right 8.82°)

Trial 2 (4 fit, 5 pump atmospheric in back, 2 pump right back)

Significant asymmetry in hind limb protraction, (left 4.45° / Right 11.18°)

Trial 6 (Narrowed, atmospheric air with 2 pumps in each bag)

Asymmetry seen in trial 2 has been significantly reduced, (Left 5.62° / Right 6.40°)

Trial 7 (Flock saddle and flair)

Significant improvement in hind limb motion, (Left 6.66° / Right 6.48°)

Generally, hind limb protraction indicates power production as the limb is placed under the horses Centre of Mass (COM). In the current study the limb is placed 6° towards the COM, which may not be as much as what was seen during the other trials however the important thing to note is that the horse is working symmetrically and in all cases this is the "ideal" in terms of training and development.

Results – Joe Pit

Own saddle, fully flaired. Significant asymmetry seen in the horse's hind limb movement during rising trot. However, during sitting trot the asymmetry seen whilst rising reduced to 0.5° difference between left and right hind limb motion. The analysis looked at hind limb protraction, tarsal flexion and fetlock hyperextension. A similar trend was observed through both conditions (rising and sitting) with reference to the degree of symmetry in the sitting versus the rising. Although not strictly related to the saddle this information has huge implications on the training and longevity of both the horse and rider.

Joe's second horse (Rocky?) showed improved range of hind limb movement when a lateral support was used / inserted (?). However a similar ratio to that found in the first horses was seen whilst sitting and rising with the second horse.

Results Michelle

Half flair with half flock performed very well with a significant increase in hind limb protraction by 5° from initial test (Initial saddle??). Similar to Henry the increase in protraction also meant that the hind limbs were working symmetrically in terms of protraction. There was a slight difference in tarsal flexion between left and right but this trend was consistent with and without a rider. There was a slight difference in hind limb protraction leading to an asymmetry when the Hydey Fully Flaired (?) was used, this created less power production, and this is also supported by the reduced protraction of the hind limb.