The Importance of Biomechanics of the Equine in a Hunter Over Fences Class

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Introduction

The hunter horse show circuit is an extremely competitive area of the sport of horseback riding.

This experiment analyzes the true correlation between the physical movement of a horse and their placing in a hunter over fences class. The goal is to challenge the theory that hunter classes are judged heavily based on politics, including money, reputation, and even physical qualities of horse. Horses with more balanced, fluid, and consistent movements should place higher than horses with less balanced, less fluid, and less consistent movements, regardless of reputation or physical qualities of horse.

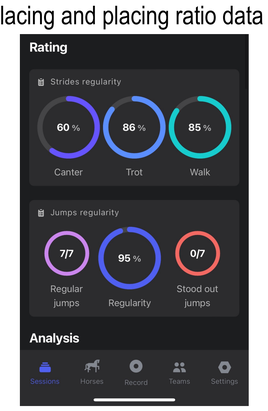
In this study, Alogo MovePro Sensors were used to evaluate the biomechanics of a horse during a hunter over fences class. These measurements included jump heigh and length, multiple balance points, jump and stride regularity, and regular jumps versus stood out jumps. This data was evaluated and compared to the placing of each horse in their hunter over fences class.

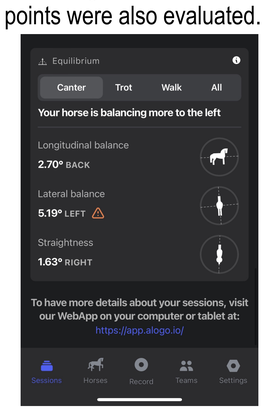
Materials and Methods

The Alogo MovePro Sensor was used at two local horse shows on horses whose riders volunteered to participate in the experiment. These horses participated in different divisions and at different jump heights. They were judged by a different judge at each show. 17 total rounds were evaluated using seven different horses.

- Show No. 1
  - Location: Memory's Hill Stables, Waynesboro, VA
  - Temperature: 85 to 91 degrees Fahrenheit
  - Weather: sunny with a light breeze
  - Arena type: outdoor, synthetic/sand mix footing
  - Jump type: white and natural poles with a variation of flower boxes, brush, and gates
  - Striding: standard
  - Divisions: Low Hunters (3 feet), Working Hunters (3 feet 3 inches), Children's Hunters (3 feet)
- Show No. 2
  - Location: Liberty University, Lynchburg, VA
  - Temperature: 78 to 87 degrees Fahrenheit
  - Arena type: indoor, sand footing
  - Jump type: white and natural poles with a variation of flower boxes, brush, and gates
  - Striding: standard
  - Divisions: Low Hunters (3 feet), Adult/Children's Hunters (3 feet), Special Children's Hunters (2 feet 9 inches), Special Adult Hunters (2 feet 9 inches), Intermediate Hunters (2 feet 3 inches)

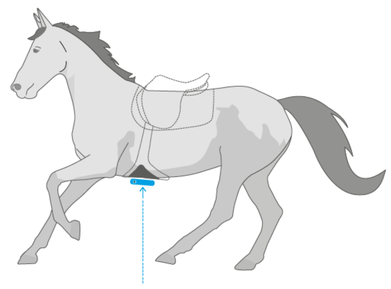
The specific data points evaluation from the Alogo MovePro Sensor were the canter regularity, jump regularity, regular jumps, stood out jumps, jump height, jump length, jump speed, previous stride, next stride, take off angle, and all balance points. Absolute placing and placing ratio data points were also evaluated.





Procedure

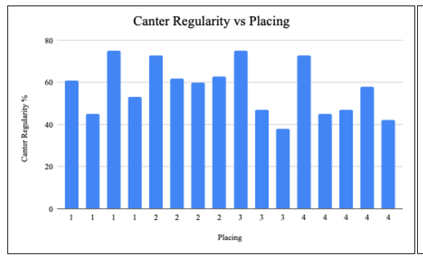
- Placement: center of the girth at midline
- Fastened with Velcro attachments
- Distance from the sensor to the ground was measured and recorded
- Monitored during any movement in the holding area to ensure proper attachment

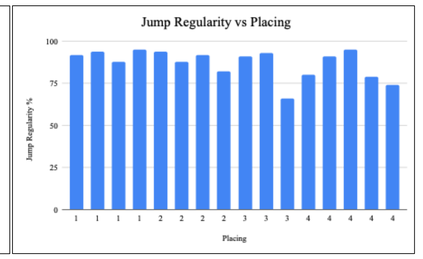


- Connected via Bluetooth to the Alogo app on a smartphone
- Recording was started as the rider entered the arena for their judged round
- Videos were taken of the round for reference
- The recording was stopped as the rider exited the arena

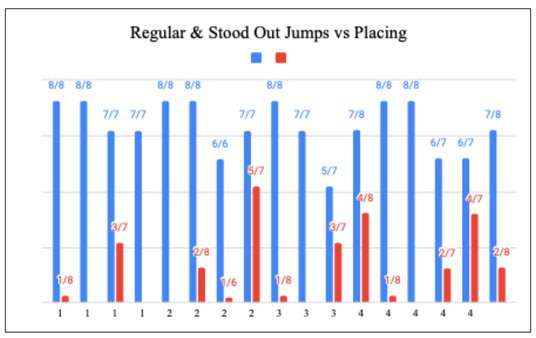
Results

Regularity vs Placing: horses with higher percentage of regular canter strides and jumps consistently placed higher in comparison to horses with lower percentage of regular canter strides and jumps.

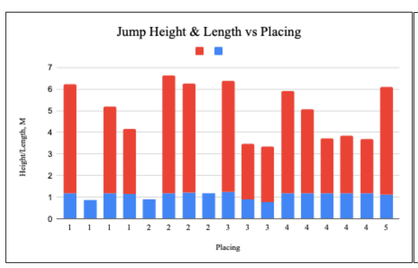


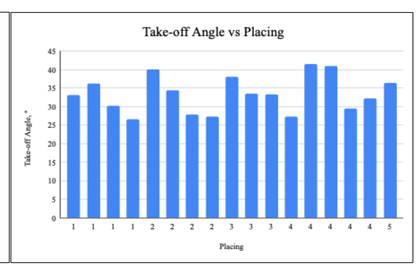


Stand our jumps vs Placing: horses with a higher number of regular jumps placed higher than horses with a higher number of stand out jumps.

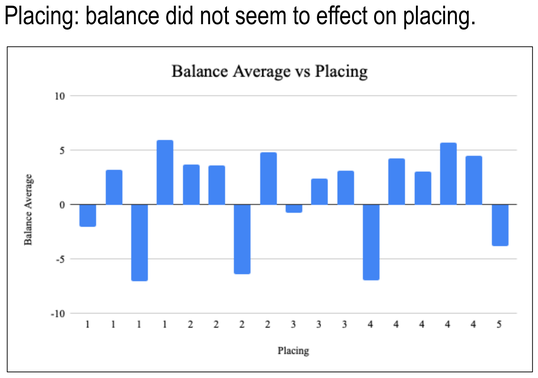


Jump height and Take-off angle vs Placing: horses with more horizontal jump styles placed higher than horses with a more vertical jump style.





Balance vs Placing: balance did not seem to effect on placing.



Discussion

- Horses with more horizontal jump styles are preferential to those with more vertical jump styles in the hunter show circuit. The takeoff angle of jumps correlated with this trend.
  - Lower takeoff angles indicate a more horizontal jump style, while higher takeoff angles indicate a more vertical jump style.
- While balance was expected to be one of the key determining factors in hunter horse show placing, there was no evidence to support that balance is heavily judged.
- Horses with more regular jumps and less stood out jumps did place higher than horses with less regular jumps and more stood out jumps.
  - This is a technique already implemented by hunter riders and trainers. Horses with more regular jumps and similar previous and next stride measurements demonstrated more fluidity in their rounds than horses with the alternative.
- Project faults
  - The judging parameters at the shows evaluated for this experiment are slightly lowered due to the intensity of the local circuit. Conducting this experiment in higher-tier hunter riding may provide different outcomes regarding the balance and placing relationship.
  - More study participants would be beneficial in obtaining a more accurate biomechanics vs placing relationship.
  - Consistent location, footing type, arena type, jump height, rider, and judge would provide more accurate information by eliminating dependent variables.

Taking It Further

- This project would be better conducted under the following parameters
  - Higher show circuit level
    - A more competitive circuit would result in less major errors and therefore more emphasis on placing based on biomechanical statistics
  - More sensors on horses from one division
    - Horses from many different divisions were used in this study. One sensor limited the amount of samples obtained from the same division and jump height. Having multiple sensors on horses competing against each other would eliminate one dependent variable and create more reliable results.
    - More sensors would also allow more samples to be taken on the same day under the same conditions, and with the same judge. This would eliminate even more dependent variables.
- This project could be conducted with multiple riders on one horse.
  - This would allow assessment of rider influence on horse biomechanics.

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